KNOWLEDGE ATTITUDE AND PRACTICE TOWARDS PERSONAL PROTECTIVE EQUIPMENT
USE AMONG STEEL INDUSTRY WORKERS IN THAILAND

Mrs. Kulitsara Kralam

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ความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของ
ผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย

นางกุลิสรา กระลาม

Thesis Title	KNOWLEDGE ATTITUDE AND PRACTICE TOWARDS PERSONAL PROTECTIVE EQUIPMENT USE AMONG STEEL INDUSTRY WORKERS IN THAILAND
By	Mrs. Kulitsara Kralam
Field of Study	Public Health
Thesis Advisor	Nutta Taneepanichskul, Ph.D.

Accepted by the College of Public Health Sciences, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

⋯⋯⋯⋯⋯⋯⋯Dean of the College of Public Health Sciences

(Professor Sathirakorn Pongpanich, Ph.D.)

THESIS COMMITTEE

⋯⋯⋯⋯⋯⋯⋯⋯⋯Chairman

(Professor Sathirakorn Pongpanich, Ph.D.)

⋯⋯⋯⋯⋯⋯⋯⋯⋯Thesis Advisor

(Nutta Taneepanichskul, Ph.D.)

⋯⋯⋯⋯⋯⋯⋯⋯⋯Examiner

(Assoc. Prof. Wattasit Siriwong, Ph.D.)

⋯⋯⋯⋯⋯⋯⋯⋯⋯External Examiner

(Jirawan Jampanil, Ph.D.)

กุลิสรา กระลาม : ความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความ ปลอดภัยส่วนบุคคลของผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย (KNOWLEDGE ATTITUDE AND PRACTICE TOWARDS PERSONAL PROTECTIVE EQUIPMENT USE AMONG STEEL INDUSTRY WORKERS IN THAILAND) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดร. ณัฏฐา ฐานีพานิชสกุล, หน้า. 125

ในอุตสาหกรรมเหล็กมีโอกาสสัมผัสกับปัจจัยอันตรายจากการปฏิบัติงาน เช่นความร้อน, เสียงดัง, แสงสว่างและสารเคมีบางชนิดจากกระบวนการผลิต ดังนั้นอุปกรณ์คุ้มครองความปลอดภัย ส่วนบุคคล (PPE) จึงมีบทบาทสำคัญในการลดความเป็นอันตรายและผลกระทบต่อสุขภาพจากการ ทำงานในอุตสาหกรรมเหล็ก ซึ่งการศึกษาในครั้งนี้มีวัตถุประสงค์เพื่อประเมินระดับของความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล และทดสอบ ความสัมพันธ์ดังกล่าวในกลุ่มผู้ปฏิบัติงานในอุตสาหกรรมเหล็ก วิธีการศึกษาแบบตัดขวางกลุ่มตัวอย่าง ที่ใช้ในการวิจัยครั้งนี้เป็นผู้ปฏิบัติงาน 336 คน จากแผนกโรงหลอมและโรงรีดในอุตสาหกรรมเหล็ก โดยทำการสัมภาษณ์แบบตัวต่อตัวกับผู้ปฏิบัติงานในการกรอกแบบสอบถาม วิเคราะห์ข้อมูลโดยใช้ การทดสอบไคสแควร์และสหสัมพันธ์แบบสเปียร์แมน ผลการศึกษาพบว่าอายุเฉลี่ย (±ค่าเบี่ยงเบน มาตรฐาน) ของผู้ปฏิบัติงานเป็น 36.58 (± 9.47) ปี ประสบการณ์ในการปฏิบัติงานในอุตสาหกรรม เหล็กของผู้ปฏิบัติงานส่วนใหญ่น้อยกว่า 5 ปี อันตรายส่วนใหญ่ที่ผู้ปฏิบัติงานสัมผัสคือเสียงดังและฝุ่น ประมาณ 50% ของผู้ปฏิบัติงานใช้ที่อุดหูและที่ครอบหูลดอันตรายจากเสียงดัง และ 62% ของ ผู้ปฏิบัติงานพบว่าได้รับความรู้เกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลอยู่ในระดับดี ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของผู้ปฏิบัติงาน อยู่ในระดับปานกลาง จากการทดสอบความสัมพันธ์ระหว่างระดับความรู้และระดับทัศนคติของ ผู้ปฏิบัติงานพบว่ามีความสัมพันธ์กับระดับการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความ ปลอดภัยส่วนบุคคลของผู้ปฏิบัติงาน ($p<0.05$) นอกจากนี้ยังพบว่าความรู้เกี่ยวกับอุปกรณ์คุ้มครอง ความปลอดภัยส่วนบุคคลที่เพิ่มมากขึ้น ส่งผลต่อการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความ ปลอดภัยเพิ่มมากขึ้นไปด้วย ($r_s = 0.494$, $p\text{-value}<0.01$) จากการศึกษาความสัมพันธ์ระหว่างความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของผู้ปฏิบัติงาน ในอุตสาหกรรมเหล็กในครั้งนี้ อันจะนำไปสู่การส่งเสริมและสนับสนุนด้วยนวัตกรรมใหม่ เพื่อให้ ผู้ปฏิบัติงานมีส่วนร่วมในการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลต่อไป

สาขาวิชา   สาธารณสุขศาสตร์   ลายมือชื่อนิสิต ....

ปีการศึกษา 2558   ลายมือชื่อ อ.ที่ปรึกษาหลัก ....

KULITSARA KRALAM: KNOWLEDGE ATTITUDE AND PRACTICE TOWARDS PERSONAL PROTECTIVE EQUIPMENT USE AMONG STEEL INDUSTRY WORKERS IN THAILAND. ADVISOR: NUTTA TANEEPANICHSKUL, Ph.D., pp.125

Background:Steel industry workers have been involved in several hazards such as heat, noise and some chemicals because of a complexity of operation process. Personal protective equipment (PPE) plays its important role in protection and prevention workers from exposing to those hazards including workers' health. Therefore, current study aimed to access levels of knowledge, attitude and practice on PPE use and to examine an association among those levels of steel workers. Methods:A cross-sectional study was conducted among 336 workers from scrap preparation and rolling mill department in a steel industry. Face to face interview was conducted for each worker to complete questionnaire. Bivariate analysis was applied by using Chi-square test and Spearman's rank correlation. Results: Average age (±SD) of participants was 36.58 (±9.47) years. Most of them had worked in the steel industry less than 5 years. Most of work hazards reported by workers were noise and dust 100%. Percentages of the practice of workers 39.9% that using PPE to protect themselves from their work, 81.2% of the workers using helmet, 87.95% of the workers using safety shoes and 86.17% of the workers using boots. Around 50% of workers reported as always use ear plug and ear muff. Sixty-two percent of participants were classified their knowledge regarding PPE use in good level. Attitude and practice towards PPE use among majority of workers were also sorted into moderate levels. Knowledge and attitude levels of those workers were associated with their practice level (p<0.05). Furthermore, an increasing of knowledge was predicted as a factor of increasing PPE use among these workers (r_s= 0.494, p-value<0.01). Discussion:An association and among knowledge, attitude and practice levels provided solid evidences to strengthen an encouragement of PPE use among steel workers through providing an innovative interventions.

Field of Study: Public Health	Student's Signature	....
Academic Year: 2015	Advisor's Signature	....

ACKNOWLEDGEMENTS

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CHAPTER I

INTRODUCTION

1.1   Background and significance of the problem

Due to growth in the economy and society. Conditions of working professionals and other workers at risk of harm. Including statistics victim from work this could be the result of work in establishments that are designed to create invalid. Work on the establishment of a production process that is not safe. Unsafe condition of working environment of the physical, chemical, biological and psychosocial. The disease caused by the work. The accident, injury, disability or death from work is likely to occur at any time. Although some establishments will have a planning structure design engineering as well be but some functional limitations may not apply engineering principles used to solve problems. It has to be designed device facilities to help in control and prevent harm to the person so that practitioners can use such protective equipment that may occur while working alongside supervision and protected by other means, according to the needs of the operational work is to ensure compliance with maximum safe. The protective equipment from the important work that is personal protective equipment.

The statistics of occupational injuries and diseases 2013 (Social Security Office Thailand 2015) by degree of loss and type of industry have suffered a number of employees suffer the highest from industrial classification of metal products 2013 is number 19,220 causes by Figure1. Occupational injuries and diseases: by type of industry 2013
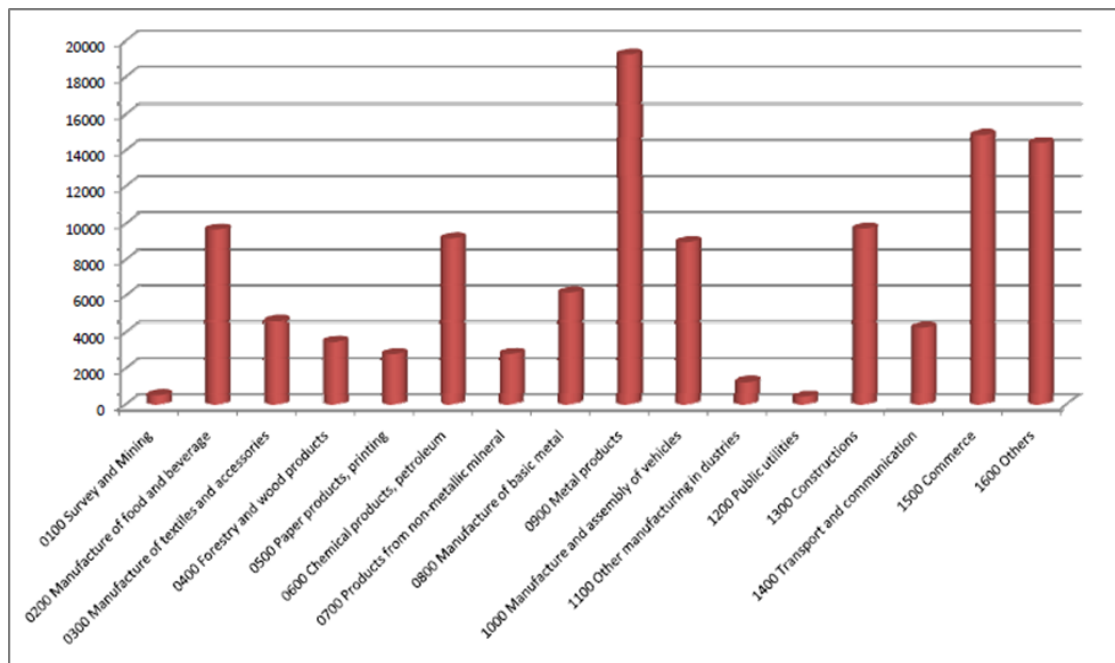
Figure 1: Occupational Injuries and Diseases: by Type of Industry 2013
(Social Security Office Thailand, 2015)

According to W.H. Heinrich (1931), who developed the so-called domino theory, the cause of the accident

- Unsafe acts a great cause accident accounted for 88% of all accidents. Actions including safety

1. There is no sufficient knowledge to work.

2. Lack of training or guidance on what is required in the work.

3. Have a bad attitude towards safe.

- Unsafe working conditions for 10% of all accidents, including the use of machinery or equipment to work deteriorated.

The work area dirty or full of clutter. The motion of no shelter or protection. Storing items in a mess and so on and 2% by "Acts of God". (International Labour Organization(ILO), 2016)

In the Occupational Safety, Health and Environment Act B.E. 2554 (A.D. 2011) (Asean Occupational Safety And Health Network(ASEAN-OSHNET), 2015) define that employer shall provide and supervise his or her employees to wear the personal protective equipment in accordance with the standards as stipulated by the director-general and employees shall have duties in wearing and maintaining the personal protective equipment so that they can be effectively used within the nature and conditions of work throughout the working period which the major of hazards in steel industry, such as accident from machine, heat, noise, illuminate, CO, chemical, vibration, radiation. (International Labour Organization(ILO), 2016) The employers strive to supplying and providing personal protection equipment for employees as required by regulation and risk in steel industry, but there are indications that personal protection equipment is not used effectively for protect workers from hazards in steel industry it may be due to a lack of information on the protection of individuals with a negative attitude towards the use it or lack of support from management. Workers may be more knowledgeable about personal protection. But that does not necessarily take advantage of it. As a result, the number of serious injuries and occupational diseases may increase. According to the personal protective equipment at work regulations. Employers must ensure that employees are provided with appropriate personal protective, coaching and training or programs that motivate safety awareness.

1.2 Research questions

1. What are the percentages of use of personal protective equipment among steel industry workers?

2. Are there any associations between knowledge and attitude, knowledge and practice and attitude and practice related to personal protective equipment use among steel industry workers?

1.3 Objectives of the study

1. To assess the levels of knowledge, attitude and practice on personal protective equipment use among of steel industry workers.
2. To examine the associations of knowledge and attitude with practice for personal protective equipment use among steel industry workers.
3. To estimate the percentages of use of personal protective equipment among steel industry workers.

1.4 Benefits of the study

Understanding the knowledge, attitude and practice on using personal protective equipment and providing recommendations and guidelines for using personal protective equipment for employees and planning and implementation of training and other activities to promote safe behavior using personal protective equipment to protect the worker from adverse health effect from environment in working of steel Industry.

1.5 Conceptual framework

Independent variables	Dependent variables

Socio Demographic

1.General Characteristics

- Gender
- Age
- Education level

2.Job Characteristics

- Department
- Working experience
- Average working time
- Hazards that they normally

Knowledge of using personal protective equipment:

- Hazards in steel industry and effect to health and safety
- The importance of using personal protective equipment
- Type of personal protective equipment

Attitude of using personal protective equipment:

- Hazards in steel industry and effect to health and safety
- The importance of using personal protective equipment
- Type of personal protective equipment

Practices of using personal protective equipment:

- Head protection
- Face and Eyes protection
- Ear protection
- Respiratory protection
- Hand and arm protection
- Body and leg protection

Figure 2: Conceptual framework

1.6 Operational definitions

Steel industry workers refers to person who working routine in steel process, Scrap Preparation department and Rolling mill department

Supervisor refers to person who was supervisor level working routine in steel process, Scrap Preparation department and Rolling mill department

Operator refers to person who was operator level working routine in steel process, Scrap Preparation department and Rolling mill department

Contractor refers to person who was contractor level working routine in steel process, Scrap Preparation department and Rolling mill department

Knowledge of using personal protective equipment refers to the ability to remember and understanding the facts about hazards in steel industry and effect to health, safety and type of personal protective equipment that the employees should use, and how to prevent themselves from health effect of hazard in their work.

- Knowledge of hazards in steel industry and effect to health and safety refers to worker knowledge about accidents, chemical, heat that working area in steel industry.

- Knowledge of the importance of using personal protective equipment refers to worker knowledge to protect the wearer's body from injury or disease. The hazards addressed by protective equipment include about accidents, chemical, heat that working area in steel industry.

- Knowledge of type of personal protective equipment refers to worker knowledge about using helmet, respirator (safety masks), hand and arm protection (gloves), eye protectors (glasses/glasses), root protection (safety shoes/boots), clothing, ear plug/ ear muff to protect them exposure hazards from steel industry.

Attitude of using personal protective equipment refers to level of feelings about hazards in steel industry and effect to health, safety and type of personal protective equipment that the workers should use, and how to prevent themselves from health effect of hazard in their work.

Practices of using personal protective equipment refers to behave wearing personal protective equipment is intended to prevent accidents and occupational diseases from hazards of steel industry.

- Head protection wearing helmet to prevent head from machine and falling material.

- Face and eyes protection wearing face shield, goggles and glasses to prevent face and eyes from particulate, chemical, heat and illuminate and splashes.

- Ear protection wearing ear plug, ear muff to prevent ear from noise.

- Respiratory protection wearing respirator to prevent respiratory system from chemical, particulate, vapors, fumes and toxic gases.

- Hand and arm protection wearing glove, leather armband to prevent hand and arm from machine, heat and chemical.

- Body and leg protection wearing clothing, apron, leather leg, safety belts to prevent body from machine, heat, chemical and falling.

- Foot protection wearing safety shoes, boots to prevent feet from machine, heat and chemical.

CHAPTER II

LITERATURE REVIEW

2.1 The concept of knowledge

Knowledge refers to the experience that people have the facts or phenomena and other details through the collection and compilation to benefit. It means something to commemorate a specific subject or reminisce about common methods, processes and situations, this behavior is only the memory. Potential by training, vision or hearing, such as knowledge about definitions. Facts about the structure and rules for how to fix the problem, knowledge is the ability to use facts or content ideas or insights or the ability to link ideas to the event. (Mungsin S, 2013) Knowledge in view of Cooper Hospital (Upienpong P, 2009) represents the first stage of the behavior associated with the ability to memorize which may be by have to see, hear or not hear about is the process of learning consists of by definition or meaning facts, theories, rules and structure solutions to problems, standards, etc. It can be said that knowledge is a matter of recognizing what needs to be remembered by using complex ideas or the ability of the brain to remember this very reason it is considered. The psychologically important and a process that leads to behavior that contributes to understanding. Bringing knowledge to the analysis the synthetic evaluation, a process that can take an idea and the ability of the brain more is in order. Comprehension the Super Horse Points out that the later stages of knowledge. It is a step that will require the ability of the brain, skills on a higher basic the level of interpretation. This may be possible by using orally, written language or the use of symbols. This usually happens after a person has received various messages, perhaps by listening, seeing, hearing or written and expressed in terms of the skills or interpret such news to hear lectures by their own words or interpreting from one language into another language. The still retains its original meaning or may express opinions or make any conclusions or predictions.

2.2 Knowledge of accident and occupational diseases.

2.2.1 Theory of accident causes

Heinrich Domino theory of accident causation

Heinrich is a pioneer in the theory of the accident. He describes the causes of accidents and the theory of human relations, the frequency and severity relationship why action is not safe management role in preventing accidents, the cost of accidents and the impact of treatment safe work practices. According to accident statistics Report of Heinrich assumed that 88 percent of accidents are caused by unsafe acts for workers by 10 percent due to unsafe conditions and two percent of all accidents involving acts of God, such as disasters. Natural disasters According to his analysis Heinrich defined. Accidental events cannot control and do not plan to object to the actions or reactions. Chemicals or radiation, resulting in injury or likelihood of its theory to explain the cause of the accident and the frequency and associated equipment. Relationship serious reason for the action is not safe management role in preventing accidents, the cost of accidents and. The impact of safe operations (Figure 3).
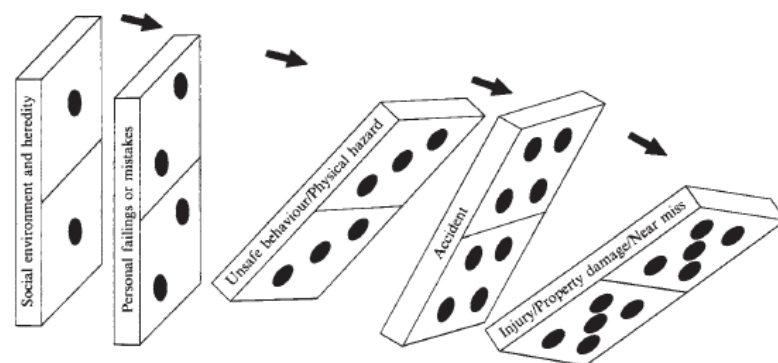
Figure 3: Domino theory of accident causation

(Cooper D, 2001)

Heinrich accepted the domino theory. This is based on five factors, respectively, as follows:

1. Ancestry and social environment. Family and social environment is the process of buying. Knowledge of customs and skills. Lack of skills and knowledge to be effective. Inappropriate social and environmental conditions can lead to the wrong people.

2. The people's mistakes (negligence); Fault or negligence of the negative features of the person. Although these undesirable characteristics may be acquired. The result of negligence acts / conditions.

3. Unsafe acts and / or mechanical or physical condition. The unsafe acts / conditions, including errors. The technical failure caused the accident.

4. Accident; Accidents caused by unsafe acts / unsafe conditions, and subsequently led to the injury.

5. Injured; Injured as a result of the accident. (Cooper D, 2001)

2.3 Knowledge of the hazards in steel industry and effect to health and safety

2.3.1 Steel production process

Molded steel currently used in electric arc furnaces (Electric Arc Furnace, EAF). The smelter is the most because this type furnaces with modern technology. Effective high temperatures can provide adequate temperature control is easy and convenient and important. The pollution occurred Compared to other types of furnaces is considered to have a high volume. The process is shown (Department of Internal Trade of Thailand(DIT), 2013)

Figure 4: Steel production process

(Department of Internal Trade of Thailand(DIT), 2013)
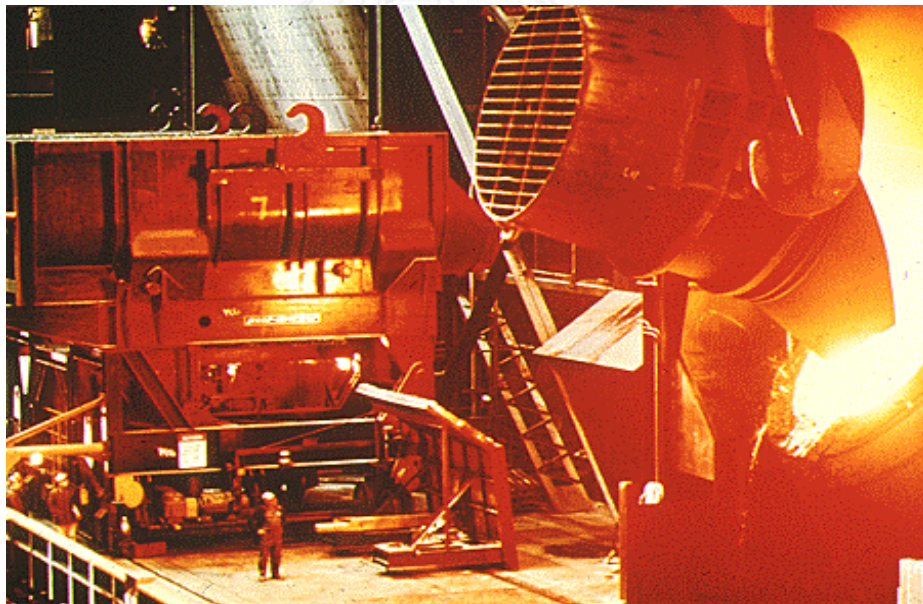
Figure 5: Hot metal charge for basic-oxygen furnace

(Department of Internal Trade of Thailand(DIT) 2013)

Figure 6: General view of electric furnace casting

(Department of Internal Trade of Thailand(DIT), 2013)

Figure 7: Steel production in the intermediate steel industry

Steel production process

(Department of Internal Trade of Thailand(DIT), 2013)

In the steel industry process will blast furnace at a very high temperature to achieve melting. Completely normal temperature is approximately 1,600 0^{c} the materials used are iron ore, coal, coke and limestone. In the burning process fuel is burned to heat up from the bottom. The lime stone in a blast furnace to act as a catalyst. Molten iron was pig iron which is fused together in the bottom of the furnace. The limestone is separated out. Combined with other parts in the form of slag when finished melting furnace will turn out. Pour molten iron in the form of pig iron with a lot carbon. The need to separate out the carbon before its next use. For the steel industry process divided into different stages Figure 8.
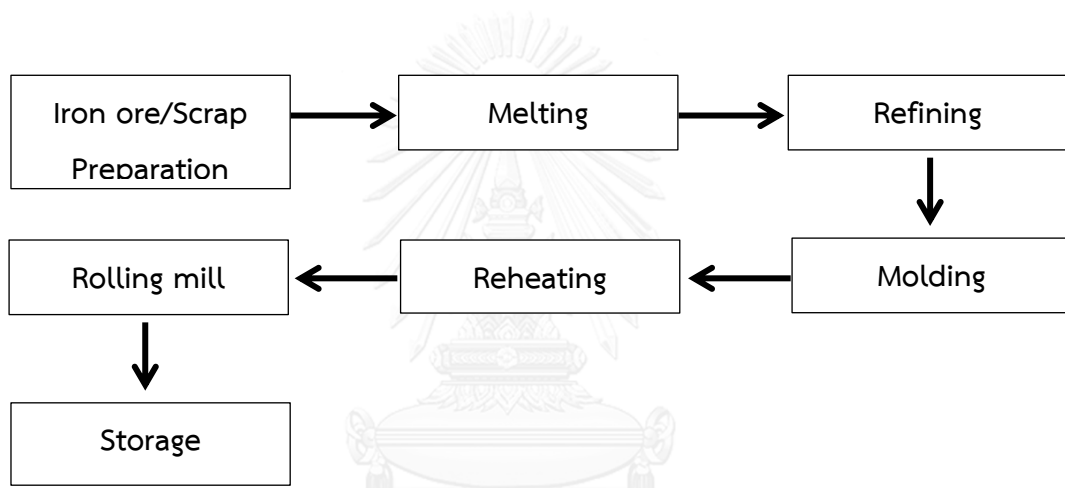
Figure 8: Steel production process
(Poonchaisi P and Bowontummarat M, 2012)

1. Iron ore/Scrap Preparation provide led by iron ore or scrap various gathered to perform sorting, cleaning and small size to be smaller in order to prepare for melting iron.

2. Melting is the process of smelting iron from material prepared in step 1 put into the oven. Blast furnace smelting called cupola furnace or furnace may be used by the electric arc or fuel. From other sources, such as charcoal, in which the melting process that will use coal to make iron ore into steel or water. Pig iron using limestone as a catalyst and a high temperature annealing to 1,600 0^{c} a very high temperature. Therefore, this step is an important step that will cause harm to the

areas such as physical heat is very high. In front of the furnace including glare caused by melting iron and the chemical is fume of the mineral substances. Steel and coal used as fuel. There may be those in which the iron ore, manganese, phosphorus, sulfur, heavy metals such as the form of slag.

3. Refining when iron or ingredients get heated Melting down it will improve pig iron by taking water samples to be analyzed for the amount of iron. Carbon, manganese, phosphorus, sulfur, iron, etc., and to have great chemical as required by CaO, Ferro City, Oregon. Ferro-manganese, CaF2, aluminum, etc., and the addition of various substances to another.

4. Molding from step 3 on steel with desired properties and then pour iron into the laddle then poured into casting molds in next steel. The sample will be bringing the steel to make once again the chemical analysis to determine whether this billet quality standards as required, which can performed after pouring iron into steel casting and when it hardens, remove the mold out. Liquid steel to be processed rebar or otherwise processed according to the following. If you want to keep the rods without privatization would be injected water cooling is then stored as steel.

5. Reheating if desired, such as steel rebar sizes. It must be baked to reheating by the steel has to be heated to 1300 0^{c} to be sent next to a steel mill.

6. Rolling mill is processed into steel rebar in different sizes by the end of the board will have a round coil, because the iron that rolled out a long coil by coiler and the steel coil. It is important to stretch it to a straight line. Then cut to the desired length, then the count tied together label steel truss fold half of the line into a bend steel. This is the final processing of steel.

7. Storage, fold in half, tying rebar already. It will be stored. Sort organizes both the size and length of rebar in the factory at a storage area. This should be the place convenient to transportation (Poonchaisi P and Bowontummarat M, 2012)

2.3.2 Hazard assessment of steel production process

Each operation will be evaluated to determine the eye, face and hand, foot and present danger to the proper PPE should be worn. The assessment will include observation of the source of the hazards below.

1. Chemical exposure (inhalation, ingestion, skin contact, eye or injection).

2. Dust / debris flying (chipping, grinding, polishing, etc.).

3. Noise (room machinery, jackhammers cage washers, etc.).

4. Temperature extremes (hot / cold).

5. Impact (reduction / flying objects)

6. Fall (tickets / holiday project high).

7. Drilling (sharp objects piercing the foot / hand).

8. Compression (roll over or catch objects).

9. Radiation (non-ionizing: UV/IR/optical interface cut furnaces, etc.).

(International Labour Organization(ILO), 2016)

Health hazards from steel melting industry

1. Particulate from the production process, resulting in a dusty place a number of steps to prepare the scrap metal dust from the sediment of slag, limestone, sandstone, etc., and a furnace. The dust from iron ore and metal-containing steel which will harm workers in the area.

2. Heat in every step of the production process of iron smelting industry. It requires high heat and practitioners in the area. Inevitably exposed to the heat from the production process them. If exposed for a long time it took effect to health. Heat exposure is a problem throughout the iron and steel industry, particularly in factories located in hot weather. Recent research has shown that, contrary to previous belief, the highest risk occurs during a fake when workers are monitored constantly hot iron over the water, even when the temperature rises. They will not continue, and their effects are limited by the intense heat. The contact surface and

using eye protection. The danger of heat stress is reduced by adequate fluid intake, adequate ventilation, the use of heat shields and protective clothing and periodic breaks for rest or work at a cooler task.

Those who work in the steel industry has suffered from the heat from the production process or machine works much like molten metal, etc. The heat makes the body unable to control normal. The cause fainting, weakness, fatigue, pain, seizures, muscle spasms, such as hands, feet, abdomen, back pain, thirst, dry skin may have a disorder of the sweat glands rash feel chilly. Sweat makes the brain and mind confusing the coordination of the muscles gently and gradually lost the pulse. Seizures may be fatal.

3.Carbon monoxide: CO is a gas resulting from the manufacturing process. Particularly in the process of iron smelting. Since iron ore is relatively high carbon component and also the carbon in coal coke used when added to the melt and from fuel burning coal, so the amount of carbon monoxide is formed, it has plenty. Especially in smelting iron with CO to 27-30%, and the process steps to produce another 7-10% and CO gas may leak out when the worker inhaled. The body would cause acute CO poisoning or when daily exposure during the work took chronic effect to the health.

4. Heavy metal in the production process several steps with the use of many heavy metals,

4.1 Nickle: Ni used in the steel manufacturing process. Using water added to the molten steel. Steel is made to do steel possesses even more strength.

4.2 Iron ore preparation is the clear separation of the ore crushed. The smaller the dust of iron oxide and is in the process of fume of steel.

4.3 Manganese: Mn using Mn into the steel production process. The steel is durable and solid is in the process of iron smelting and metal matrix composites it is dangerous to operate.

4.4 Selenium, Se is in the process of cooking meat iron. The additives to prevent corrosion of steel.

4.5 Antimony An is a heavy metal in the process of cooking meat, iron steel manufacturing process. In order to strength steel tough and durable, so the worker in such procedures, it may have exposure to the health.

4.6 Telenium, Ti is a heavy metal that is put into the preparation of steel. To prevent the steel decay. Corrosion as well as other heavy metals. When a worker gets into the body, it is harmful to health.

(Poonchaisi P and Bowontummarat M, 2012)

5. Noise

The steel industry is one of the noises, although hearing conservation program reduced the risk of hearing loss. Sources include smoke extraction systems, vacuum systems that use off steam, transformer, and the arc electric furnace and rolling mills, large fans used for ventilation, air at least half of workers exposed to noise handicapped by the loss of hearing that occurs after a mere 10 or 15 years on the job. Hearing conservation program, described in detail elsewhere in this encyclopedia includes noise intermittently and hearing evaluation, engineering, noise control and maintenance of machinery and personal protective equipment for workers, and education and training. Causes of hearing loss other than burning eardrums with the particle size of the slag or molten metal from the drum sound impulses and severe injuries from falling or moving objects. A survey of compensation claims filed by Canadian steelworkers revealed that half of those with hearing loss also have tinnitus occupation. (International Labour Organization(ILO), 2016)

Those who work in the steel industry often the problem of noise from various sources, such as belt grinders listening gear to rotate the engine generator smash hit in the compression process. In factories and weaving sacks or metal which level of noise. According to international standards, requiring up to 85 dB(A) for eight hours of work per day, 90 dB(A) when working four hours a day. The standard of Thailand which is defined in the Ministry of interior safety in the work on the environment. The volume of the sound received by the employees. Consecutive 90 dB(A) if the work does not exceed eight hours per day. (Asean Occupational Safety And Health Network(ASEAN-OSHNET), 2006)

6. Illuminate

The dangers of red light under the red light also divided into three sub-wavelength range is near the middle and far in the distance is the length of light waves above and cascaded down the order. This type of light caused by oscillations of the electrons around the outside of the circuit. High energy and when to get back to normal. It causes the light from the source of light is caused by the metal welding and hot objects. The danger of the red light usually associated with northern light purple and optical wavelengths. The eye can see in the industrial sector blown glass molded metal welding and various kinds of work in the bright sunlight. Workers usually get the red light together with light. North violet and visible light, however, the mechanism of damage is different and how to measure the size of the light as well as the proposed safety standards for the different wavelengths. The red light under the long run it will be swallowed by the black eye. The shorter wavelengths to shine. A black eye and was absorbed by the lens until a cataract from heat cataract mechanism. The danger of this infrared ray. The light is absorbed in the cells of the eye and the lens and while it absorbs infrared rays to release energy to the cell, so the molecules vibrate and heat up. The heat causes the precipitation of substances contained in the cell. The cells frustration. (The Engineering Institute of Thailand (EIT), 2015)

7. Accidents in the steel industry, injury of the machine and heat from used in the operation melting. Scrap or parts fall building upon his hands worker or machinery pulled into the machine as

- unguarded machinery

- slips, trips and falls

- falls from height

- falling objects

- skin contact with chemicals

- contact with hot metal

- fire and explosion (International Labour Organization(ILO), 2016)

2.4. Knowledge of Personal Protective Equipment

2.4.1 The importance of using personal protective equipment

When exposure to hazards cannot be engineered completely out of normal operations or maintenance work, and when safe work practices and other forms of administrative controls cannot provide sufficient additional protection, a supplementary method of control is the use of protective clothing or equipment. This is collectively called personal protective equipment, or PPE. PPE may also be appropriate for controlling hazards while engineering and work practice controls are being installed. For specific OSHA requirements (OSHA 3151-12R 2003) on personal protective equipment (Occupational Safety and Health Administration (OSHA), 2003)

PPE Definition

Personal protective equipment (PPE) as safety equipment and accessories for a specific situation or the nature of the work involved or the conditions under which people are working need to wear or use their personal protection to reduce the risk (University of South Australia (UniSA, 2013) definition of PPE is defined in the Regulation. All devices (Including clothing for protection against the weather) which is intended to be worn or held by people at work and to protect him against one or more risks to his health or safety as helmets, gloves, eye protection high visibility clothing, safety footwear and safety harnesses. (Health and Safety Executive (HSE), 2013)

Personal Protective Equipment or PPE is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal Protective Equipment includes face shields, safety glasses, hard hats, safety shoes, coveralls, gloves, ear protection, vests and respirators. (Magoro F, 2012)

PPE requirements specified for applications under the Worker Protection Standard (WPS), but there is no requirement for non-WPS, products used by villagers or products specifically intended for production use. However, to protect human health, the following recommendations will be presented definition of personal protective equipment, personal protection (PPE) as safety devices and equipment for specific scenarios or areas. The nature of the work involved or the conditions under which people are working need to wear a personal protection. To reduce the risk end-use products used in occupations all have a handler PPE basic minimum long sleeves, long pants and socks, and socks and shoes. (Norkaew S, 2009)

Personal protective equipment (PPE) is an important way of preventing injuries in the workplace. Ideally, the best way is to maintain a safe working environment and eliminate potential hazards. PPE should be relied upon as the last line of defense in place, it is impossible in practice to control hazards at the source. Use personal protection generally means working in potentially hazardous environments and applications is an important way of preventing injuries.

It is therefore important to ensure that the equipment chosen is both reliable and effective, it is used correctly and the maintenance and usage has undergone adequate training. The aim of this book is to raise awareness of occupational safety and health practices and proper use of personal protection of people from all walks of life. (Wikipedia, 2015)

The workers are engaged in a variety of occupations are exposed to a significant risk of death or injury from being hit by objects in the workplace. Data incident, OSHA stated that an important part of the work-related injuries and deaths involving workers being struck in the eye, head, face, hands and feet by foreign objects. Two major factors that caused these injuries have been identified: personal protective equipment was not worn most of the time; and when some kind of protective equipment is worn, it does not fully protect workers. For example, studies show that 70% of people who suffer an injury for not wearing gloves. Injured his hand for the remaining 30% of the workers were wearing gloves from the glove is either insufficient damage or the wrong type for the current hazardous hard hats, goggles, face shield, earplugs, boots, foot steel ventilation What do all these have in common? They all have various forms of personal protective equipment. However, data from the Bureau of Labor Statistics show: Hard hats were worn by only 16% of workers who received a head injury, even if the two pieces to fit them for certain jobs in specific places only 1% of the estimated 770 workers were injured, suffering face, wearing protective face; only 23% of workers with a foot injury and wear shoes or boots that about 40% of workers with an eye injury, wear eye protection. Most of these workers have been injured while performing their usual tasks, the agency normally. Oregon, OSHA standards require employers to employees and must be used with appropriate protective equipment. "The probability that the" injuries can be prevented by such devices. Standards are also set aside for a specific job. While the use of personal protective equipment is important, it is just a form of extra protection necessary at all hazards cannot be controlled by other means such as engineering controls. Engineering controls are important, particularly in hearing

protection and respiratory systems with specific standards urges employers to take all steps possible to control the hazard. (U.S. Department of Labor, 2015)

2.4.2 Type of personal protective equipment

Personal Protective Equipment includes a variety of devices and garments to protect workers from injury. Personal Protective Equipment is designed to protect head, face, eyes, hands & arms, feet, and whole body. Personal Protective Equipment includes items such as:

• Head protection: Safety Helmet

Safety helmet is designed to protect the head from different types of injuries. All the employees working in the plant should wear the safety helmet because there are many chances of falling of the objects like blooms, spare parts, and other material from the heights. The helmet can prevent the head from severe injuries. Face shield helmets protect the front portion of the face from injuries

Figure 9: Safety Helmet

(NPC Safety and Environmental Service Co,. 2016)

• Face and Eyes protection: Face Shield / Goggles / Glasses

For protection from the face of solid proof. Splashes of liquid chemicals or other hazards from welding

Figure 10: Face Shield

(3M, 2016)

Goggles/Glasses protect the eyes and eye socket and immediate face parts around eyes from impact, dust and splashes. Some goggles fit over corrective lenses.

Figure 11: Goggles / Glasses

(3M, 2016)

• **Ear protection: Ear Muffs / Ear Plugs**

These protect the ears by reducing high noise levels that get through ears. This amount of this reduction is referred as attenuation. If the worker is exposed to noise at or above 85dBA for about 8hrs daily then he should certainly be provided with ear plugs or ear muffs.

Figure 12: Ear Muffs / Ear Plugs

(3M, 2016)

• **Respiratory protection: Safety Mask**

Mask filter pollutants out of the air before entering a respiratory mask filter. Particles and respiratory gases and vapors and atmosphere supplying respirator.

Figure 13: Safety Mask

(3M, 2016)

• Hand and arm protection: Gloves

Durable gloves made of metal mesh, leather or canvas which protect from cuts, burns and heat are provided. These are fabric coated. They help in preventing electric shocks. These are also liquid resistant. Thus they protect the palms and hands from getting injured.

Figure 14: Gloves

(Pangolin Safety Product Co,. 2016)

• Body and leg protection: Clothing, apron, leather leg

These protect the body from splashes of hot metals and other hot liquids. Impact of hard tools, machinery and other material will be less if the fire resistant coats are on the body. The fire resistant coats are made up of treated wool and cotton which are heat resistant and also to some extent fire resistant. They can suit to the different working conditions.

Figure 15: Clothing, apron, leather leg

(Pangolin Safety Product Co,. 2016)

- **Safety Harness**

These are provided to the workers who are working at the heights. These protect the worker from accidental falls and severe injuries.

Figure 16: Safety Harness

(3M, 2016)

- **Feet protection: Safety Shoes / Boots**

Some heavy material or rollers may fall or roll down on to the foot. Spark nails and spokes may pierce into the lower side of the ordinary shoes or chappals. Molten metal or hot fluids may fall on the foot. All these cases damage the foot severely. In order to avoid and minimize such situations safety shoes made up of impact resistant toes and heat resistant soles are provided to the workers. These are even electrically non – conductive. (A. and Swathi K 2003)

Figure 17: Safety Shoes / Boots

(Pangolin Safety Product Co,. 2016)

2.5 The concept of attitude

Attitude means to feel like or dislike the person on the matter. This is due to the experience gained increased but the process is slow or choppy last, but kind of attitude and experience gained. This may be the attitude of others toward what it was. Attitude is the availability of individual items is about the concept of a person or place that is good or bad. Satisfied or dissatisfied the tendency to behave like that to support or oppose to fight or retreat attitude is something that can be implanted or changed since was child adoration and may develop as a stable behavior later. This forms the personality of the situation. Attitudes are changing the environment and the process is as follows:

1.Compliance, such as accepting others because we won or accepted by others or to avoid punishment.

2.Identification is an expression for the same member of society or other people to see that they do or to our relationship with others.

3.Influenced by others because of their internalization which is likely to be the attitude of individuals. (Mungsin S, 2013)

Typically, when we see the attitude of the people we're trying to explain his or her behavior. Attitude is a complex set of what we usually call personality, beliefs, values, behavior and motivation. For example, we understand when people say that. "She has a great attitude towards work" with "her attitude to the working poor." When we talk about the attitude of some people who we're referring to the emotions of a person behavioral attitude of individuals towards preventative medicine covers his or her point of view on the topic. (Like thoughts); How he or she feels about this topic. (Eg, emotional), as well as implementation. (Eg, behavior), he or she was involved in as a result of the attitude in defense problems. This Health is a tri-component model of attitudes. (Pickens J, 2005)

Type of attitude

1.Positive attitude is feeling to person, object, environmental in a good or agree.

2.Negative attitude is an expression or feeling to person, object, environmental in a bad or disagree

3.Negative Attitude is a neutral attitude may be because there is no knowledge on the matter or matters in us. Attitude is likely or not likely to know about it before. (Palusuk D and Phonghanyuth S, 2005)

Conclude that attitude means feeling the idea or belief and more likely to express a person's behavior. The reaction by the estimation that they like or dislike. That will affect the person's response. Positive or negative to the people, things and situations in the environment of the person by this attitude learn or managed using the experience and attitudes that can be learned or interpreted from what people say unofficially or from the official survey or from the behavior of those individuals. (Upienpong P, 2009)

Attitudes towards PPE

The findings of study of community football players' attitude towards PPE in Australia, conducted by Braham, Finch, Mc Intosh and Mc Crory revealed that 73.6% reported wearing mouth guards during the previous playing sessions (Braham R, Finch C et al., 2003) as compared to only 2.1% who were wearing headgear. The common reasons supplied for not wearing PPE were:

• it was too uncomfortable; and

• they did not like it.

The high use of mouth guards reflected a favorable attitude towards the use of PPE by the players. The low use of headgear reflected a low acceptance of this form of protection in sports. (Braham R, Finch C et al., 2003)

2.6 The concept of practice

Practice: The individual actions this may be caused by the accumulation of past experience or perception of a new set of guidelines based on a review of the trial itself took action and evaluation when the benefit is taken as their next practice. (Mungsin S, 2013)

Practice: (Rogers E, 1962) have managed to carry out the final stages of the adoption process namely recognition interest reflective practice and practice completely. While believing attitudes, beliefs, values and perceptions, as well as the characteristics of the selected variables will influence behavior.

Practice: (Upienpong P, 2009) to perform an act of knowledge and understanding or experiences that are the physical expression of the situation in response to stimuli or solve problems.

Practice: has provided meaningful learning behavior. Psychomotor domain is capable of more efficiently. Performance-related system of organs is the fifth step.

1. Imitation is an interesting option.

2. Manipulation to act as a focus.

3. Precision is a decision made as to accuracy.

4. Articulation the action that it is correct conscientiously continues.

5. Naturalization acts until they can practice their skills. It automatically

5.1 Preventive health behavior refers to the practice individuals to prevent disease, including exercise, eating a healthy diet, non-smoking, use belts when driving, etc.

5.2 Illness behavior refers to the practice when a person acts. Symptoms include neglect to ask friends about their symptoms to seek. Medical fee to escape from society, etc.

5.3 Sick-role behavior refers to the practice where individuals after the diagnosis, as the result of medication prescribed by regulation. Diet, exercise Reduction or termination of activities to make the symptoms even more.

2.7 Knowledge, Attitude and Practice: KAP

The relationship between knowledge, attitudes and practices. Knowledge, attitude and practice of health promotion and prevention of it has consistently said is that if a person knowledgeable about the disease and knowledge about how to protect themselves and have a positive attitude towards such practices. He will practice healthy habits consistently well as a lot of people quit eating raw fish to liver fluke or quit smoking to prevent respiratory diseases on the other hand, if he has no knowledge. A bad attitude I like to practice he will not practice desirable behavior. May avoid or resist showing health-promoting behaviors, like many people with lung cancer. Because of the smoke, he does not know that smoking is harmful to the body and a cause of lung cancer. Although some individuals have the knowledge, behavior and attitude toward such behavior, but he did not follow the example.

- Some people know that smoking is harmful, but saw others smoking and thought that the action that he has a good personality or reduce tension chose to smoke.

- Most people know that wearing a helmet while riding a motorcycle can help prevent or reduce the impact to the head was an accident, and most people agree on such benefits but in reality, it also found. Motorcyclists people not wearing a helmet. This is because there are other factors that influenced the practice itself as discomfort when worn. The hassle of storage when not in use or helmet so expensive.

The concept of KAP has been used in research and behavior described extensively in the particular behavior on injury and illness prevention. It is a behavior that occurs when a person knowledgeable about the consequences of their behavior and how that behavior and a positive attitude to practice that behavior but it needs to research, knowledge, attitudes and practices of individual behavior are related in any direction if there is a positive relationship. To promote knowledge and understanding increased as much if negative relationship must change attitudes.

Urged the importance of health and accelerate the empowerment to act boldly on the right things to healthy. (Mungsin S, 2013)

2.8 Previous study

A. & Swathi K, (2003) There have been numerous studies on KAP as well as on PPE. In 2003, a study on knowledge, attitude and practice of personal protective equipment in Visakhapatnam steel plant (2003) The study aimed at finding out the prevalence of good knowledge, appropriate attitude and safe practice. Among printing workers exposed to hazard of steel, and to see if safe practice was influenced by the knowledge of and the attitude towards the harmful effects of hazard of steel or not. From each unit random samples of 30 employees were surveyed and the information on Knowledge, Attitude and practice of PPE was collected. The survey was conducted during 25th Nov 2002 to 1st Feb 2003. Possible hazards and types of personal protective equipment (PPE) used in each department of Visakhapatnam Steel Plant (VSP) were observed and given. It is evident from the table that the most common hazards expected are falls, slips, dust and noise. PPE used to protect themselves in various departments of Visakhapatnam Steel Plant are safety helmet, safety shoes, dust masks, goggles, fire resistant coat, gloves, ear plugs and ear muffs the response particulars of participants in the survey. With regards to knowledge on PPE, and attitude towards PPE, in all the departments surveyed, 75% to 97% employees responded positively. But, in practice, it is observed that only up to 80% responded positively.

Pattamung P, (2003) There have been numerous studies on factors related to the acceptance of personal protective equipment of production employee in metal product factories in Ayuthaya province. The sample of 349 production employees in 4 medium metal product factories was used in this study. The factors in this study were the personal characteristic factors, the psychological factors, the condition of work factors and the use of personal protective equipment factor. The personal characteristics factor were gender, age, education, status and working experience. The psychological factors were knowledge, attitude, and information exposure

behavior, cooperate in safety activity behavior. The condition of work factors were condition of work, organization characteristic the use of personal protective equipment. The questionnaire was used to collect the data. The 340 questionnaire or 97 percent were returned. The statistical tools used to analyze the data were mean, percentage, standard deviation, Chi-squares and Pearson product moment correlation significance at 0.05 level.

The result as follow

1. The personal characteristic factors

    1.1 There is significance relationship between gender and an acceptance of personal protective equipment at the 0.05 level.

    1.2 There is significance relationship between age and an acceptance of personal protective equipment at the 0.05 level.

    1.3 There is significance relationship between education and an acceptance of personal protective equipment at the 0.05 level.

    1.4 There is significance relationship between status and an acceptance of personal protective equipment at the 0.05 level.

    1.5 There is significance relationship between working experience and an acceptance of personal protective equipment at the 0.05 level.

2. The psychological factors

    2.1 There is significance relationship between personal protective equipment knowledge and an acceptance of personal protective equipment at the 0.05 level.

    2.2 There is no significance relationship between attitude about personal protective equipment and an acceptance of personal protective equipment at the 0.05 level.

    2.3 There is no significance relationship between information exposure behavior and an acceptance of personal protective equipment at the 0.05 level.

2.4 There is no significance relationship between cooperate in safety activity behavior and an acceptance of personal protective equipment at the 0.05 level.

3. The condition of work factors

3.1 There is no significance relationship between condition of work and an acceptance of personal protective equipment at the 0.05 level.

3.2 There is no significance relationship between organization characteristics and an acceptance of personal protective equipment at the 0.05 level.

4. The personal protective equipment factor

Production employees used personal protective equipment the average of 71.91 percent.

Magoro F, (2012) There have been numerous studies on KAP as well as on PPE. In 2012, a study on knowledge, attitude and practices regarding personal protective equipment amongst stevens lumber mills employees in the capricorn district of limpopo province, south Africa. The study aimed at finding the purpose of this study was to establish whether PPE were used effectively, and to determine the knowledge about, attitude towards and practices of PPE by SLM employees. A quantitative research study was conducted using a questionnaire to gather data from employees who were working in a production area and who were exposed to possible occupational injuries and diseases. Two hundred and six employees responded to the questionnaire. The findings revealed that employees demonstrated inadequate knowledge about PPE and compliance while using PPE was not satisfactory. Conclusion there was an inappropriate response to the majority of the questions which indicated that the respondents had little understanding of PPE. They also demonstrated a negative attitude, and non-use of PPE.

Jamklang U, (2003) There have been numerous studies on factors affecting behavior in the use of personal protective devices among furniture manufacture workers in bang sue district, Bangkok metropolis. In 2003, the study aimed at finding the importance of this research is the behavior of practitioners in the use of personal protective equipment. (PPDs) detailed several factors that have been gathered and analyzed, as well as interpersonal relationships. Health beliefs factors, factors that influence the use of PPDs and behavior in this matter. Study 280 workers in the production of furniture located in Bang Sue, Bangkok. Were chosen as samples I used a questionnaire and analyzed by computer. The study indicated that 58 percent of workers with a high level of faith. They have been exposed to pollutants while 49 percent of workers with a high level of. The belief that the danger of severe pollution. In addition, 50 percent of the sample. Recognizing the benefits and drawbacks of using the factors that influence the PPDs is divided into two categories: Internal factors, such as coughing, breathing problems, loss of hearing. Headache and external factors such as knowledge about the dangers of pollution, illness or injury among. Associates Award for the use of PPDs that the warning labels on the equipment of 96 percent. The workers have shown that low levels of being influenced by internal factors relating to the use of PPDs while 94 per cent of workers were found to have low levels of being influenced by external factors as regards behavior of workers in the use of PPDs, it was found that 29 percent of workers who use voice prevent 92 percent of workers who use equipment and 69 percent of the dust. Workers use protective devices volatile. The percentage of workers moderate level of PPDs for 70 percent of workers in the use of drawing PPDs less. Other than the internal and external factors have influenced more people to use PPDs. The combination of a portion of the painting, along with internal and external factors anticipating the increasing use of PPDs (13.5 percent).

(Jamklang U 2003)

Tinnasulanon A, (2003) There have been numerous studies on KAP as well as on PPE. In 2003, a study on Knowledge and attitude on safety behavior of officer in Provincial Electricity Authority in case study: engineering business unit, construction and maintenance business unit. Result of this research showed that a majority of officer had a high level knowledge and attitude but the officer had a moderate level of safety behave. Officer with different age, position, work experience had different knowledge safety with statistical significant at the level of 0.01, 0.05 and 0.01 respective. There was no statistically significant relationship when gender, education, training experience and work related injuries experience were varied against their attitude. It was found that knowledge and attitude had relationship with statistically significant at the level of 0.01 while attitude and behaviors had relationship with statistically significant at the level of 0.01 but knowledge and behavior had no statistically significant relationship. (Tinnasulanon A, 2003)
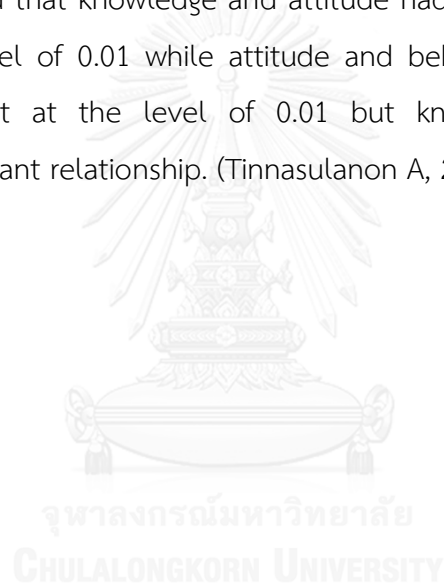
CHEPTER III

MATERIALS AND METHOD

3.1   Research design

The study design was a cross-section study to assess the levels of knowledge, attitude and practice towards personal protective equipment use among steel industry worker in a steel industry in Thailand during May - June, 2016.

3.2   Study area

A steel industry was located in Map Ta Phut Industrial Estate, Rayong Province, Thailand.

3.3   Study population

The study population of this study was all workers who worked in a steel industry, Rayong Province, Thailand. Steel industry had around 600 persons from 10 departments (Figure 18).
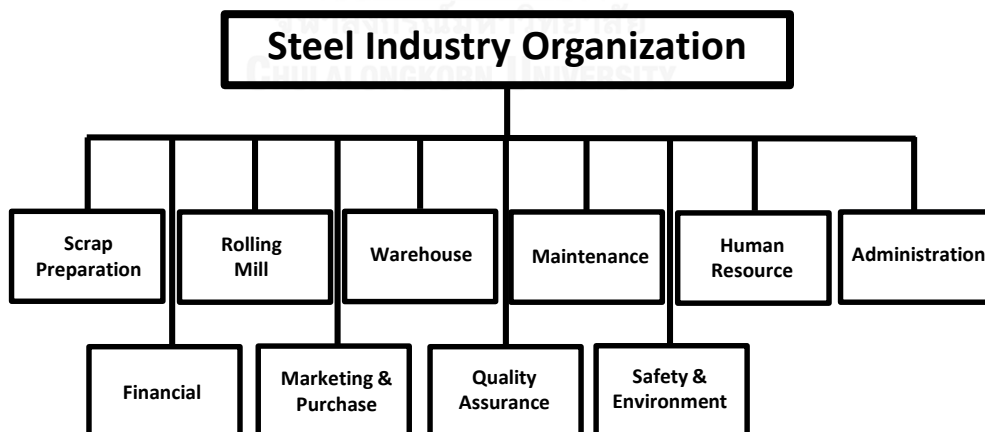
Figure 18: Steel Industry Organization

3.4   Sample and Sample Size

Sample of this study was 350 workers from 2 departments in a steel industry, Rayong Province, Thailand. Researcher **select all** steel industry workers who was in Scrap Preparation department and Rolling Mill department in steel industry (Table 1). These processes was selected because of the highest accident incidence and hazards such as accident from machine, noise, heat, illuminate, dust, chemical, splashes, Carbon monoxide (CO).

Table 1: The sample size who works in Scrap Preparation department and
         Rolling Mill department.

Department	Hazards	Number of Workers
Scrap Preparation (SP)	Accident from machine, Noise, Heat, Illuminate, Dust, Chemical, Splashes, CO	174
Rolling Mill (RM)	Accident from machine, Noise, Heat, Illuminate, Dust, Chemical, Splashes, CO	176
	Number of workers	350

3.5   Sampling Technique

Current study was **select all** steel industry workers who works in Scrap Preparation department and Rolling Mill department in steel industry so sampling technique was not necessary to perform.

3.6   Research instruments and measurements

The questionnaire was employed in this study to access the knowledge, attitude and practice on using personal protective equipment of hazards in Steel Industry. The questionnaire consists of four parts.

Part A (Socio-demographic):

Part A.1 General Characteristics

There were 8 questions in this part. The questions include gender, age, education level, smoking and drinking.

Part A.2 Job Characteristics and working experience

There were 5 questions in this part. The questions include department, working experience, average working time and hazards that workers normally expose.

Part B (Knowledge regarding using personal protective equipment)

In this study, the questionnaire was employed to assess the knowledge, attitude and practice on using personal protective equipment of steel industry workers. The questionnaire was modified from a questionnaire previously used with employees of Visakhapatnam steel plant (Akbar Ziauddin, K. Swathi, 2003)

There are 16 questions in this part. Questions are related to understanding of using personal protective equipment in workers' job including matching type of PPE and environmental hazards and concerning of effect on health and occupational safety.

A correct answer was given 1 score and 0 score for wrong answer. The score varied from 0 - 16 points and was classified into 3 levels as follows: Bloom's cut off point, 60% - 80% (Bloom cut off points were adopted from Ms. Nahida's KAP (knowledge, attitude and practice) Study, 2007) Bloom's cut off points was used to determine knowledge level. The scores were classified into Good Knowledge (80% - 100%), Moderate Knowledge (60% - 80%) and Poor Knowledge (Less than 59%) based on bloom's cut off points (Ms. Nahida's KAP Study, 2007)

Good Knowledge (80-100%)	13 - 16	scores
Moderate Knowledge (60-79%)	10 - 12	scores
Poor Knowledge <60%	0 - 9	scores

Part C (Attitude regarding using personal protective equipment)

In this study, the questionnaire will be employed to assess the attitude regarding using personal protective equipment of steel industry workers. The questionnaire was modified from a questionnaire previously used with employees of Visakhapatnam steel plant (Akbar Ziauddin, K. Swathi, 2003) and adopted from Miss. Doungta Theanklum (health belief and self-protection behavior) Study, 2007

This part included the attitude of the people towards using personal protective equipment and it was assessed by using Likert's scales. There were 12 statements which included both positive and negative. The rating scale was measured as follows:

Positive Statement		Negative Statement	
Choice	Scores	Choice	Scores
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Neural	3	Neural	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

The score varied from 0 to 60 and all individual answer were summed up for total scores and calculated for 25th to 75th percentile of theses. The scores were classified into 3 levels (Good Attitude, Moderate Attitude and Poor Attitude).

Good Attitude (≥75th percentile)	43 - 60	scores
Moderate Attitude (25th - 75th percentile)	38 - 42	scores
Poor Attitude (≤25th percentile)	0 - 37	scores

Part D (Practice of workers about using personal protective equipment to protect themselves from their work)

In this study, the questionnaire will be employed to assess the practice of workers about using personal protective equipment to protect themselves from their work. The questionnaire was modified from a questionnaire previously used with employees of Visakhapatnam steel plant (Akbar Ziauddin, K. Swathi, 2003) and adopted from Miss. Doungta Theanklum (health belief and self-protection behavior) Study, 2007

There were 19 questions in general practice of the workers on using personal protective equipment by hazards in Steel Industry. The workers was asked about they used each personal protective equipment, if they answered always use they will be given with score 2, if they answered sometime use they will be given with score 1, and if they answered never use they will be given with score 0.

Scoring

The sample selected is now the only option. Scoring is as follows.

Choice	Scores
Always	2
Sometime	1
Never	0

The score varied from 0 - 38 points and was classified into 3 levels (Good Practice, Moderate Practice and Poor Practice) as follows: all individual answer was summed up for total scores and calculated for 25th to 75th percentile of theses.

Good Practice ($\geq 75^{th}$ percentile)	27 - 38	scores
Moderate Practice (25th - 75th percentile)	21 - 26	scores
Poor Practice ($\leq 25^{th}$ percentile)	0 - 20	scores

3.7 Validity and reliability of questionnaire

Validity

Validity is the test which measures the desired performance and appropriate inferences can be drawn from the results (New Horizons for Learning, 2007). The assessment accurately reflects the learning it was designed to measure. Content validity was ensured by taking suggestions from qualified persons. The questionnaire was amended according to the suggestions. Score for IOC showed in Appendix B.

Reliability

Reliability is the measure of consistency for an assessment instrument. The instrument should yield similar results over time with similar populations in similar circumstances (New Horizons for Learning, 2007). To ensure reliability, the questionnaire was pre-tested before the actual data collection began, with 30 workers who are supervisor, operator and contractor position in Scrap preparation department and Rolling mill department in steel industry at Chonburi Province and the internal consistency was analyzed by using Cronbach's Alpha Coefficient. Upon analysis, the Cronbach's Alpha result was 0.729 for knowledge part, 0.740 for attitude part, and 0.782 for practice part. The overall Cronbach's Alpha Coefficient value was 0.782.

3.8   Data collection

Data collection face to face interview with researcher and 2 researchers assistants who had work experience in safety and environmental. Two researcher assistants were trained from the research to understand interview method, research process.

3.9   Data analysis

Statistical technique

The licensed SPSS software for windows version 16 (Chulalongkorn University) was used in analysis. Frequency tables of demographic characteristics, knowledge, attitudes and practices were tabulated. Chi square test was applied to test relationship between knowledge and attitude, knowledge and practice, and attitude and practice. In this analysis a p-value of less than 0.05 and 0.01 were considered to be statistical significant.

Testing normality of data used SPSS software for windows version 16 was used for quantitative data analysis by Kolmogorov - Smirnova. The results was non-parametric for attitude regarding using personal protective equipment and practice of workers about using personal protective equipment to protect themselves from their work showed in appendix B.

Descriptive statistics such as frequency, percentage, mean and standard deviation were used primarily to summarize and explain the data to make it more graspable.

Inferential statistics

Chi square test was used to describe an association between knowledge and attitude, knowledge and practice, and attitude and practice

Spearman's Rank Correlation coefficient was used to describe between continues data including knowledge and attitude, knowledge and practice, and attitude and practice. Interpretation was done as follow. (Hinkle, 1998)

Interpretation the correlation

Absolute Value of r_s	Interpretation
0.90 to 1.00	Very high correlation
0.70 to 0.90	High correlation
0.50 to 0.70	Moderate correlation
0.30 to 0.50	Low correlation
0.00 to 0.30	Little if any correlation

3.10   Ethical consideration

This study was approved by The Ethic Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University. With the certified code COA No.094/2559, all participants signed a consent form prior to participation in this study. (Appendix A).

CHAPTER IV

RESULTS

4.1 Socio demographic

This study was conducted in steel industry workers. 350 workers (174 workers from Scrap Preparation department and 176 workers from Rolling Mill department) were invited to participate in this study. The response rate was 96%. Totally, 336 workers returned questionnaires back. From those number, 167 workers were from Scrap Preparation department and 169 workers were from Rolling Mill department (Table 2).

Table 2: Number and percentages of response this study in steel industry workers

Department	N (Workers)	n (Workers)	Percentage (%)
Scrap Preparation	174	167	95.97
Rolling Mill	176	169	96.02
Total	350	336	96

A.1 General Characteristics

The majority of workers were male (95.8%). The mean and median age of workers was 36.58 and 35 years with a standard deviation of 9.478. The age ranged from 22 to 53 years in Table 3. shows that the majority of the workers (39.6%) were in the age range of 41 – 50 years, 33.3% were younger than 31% years, 25.6% were in the age range of 31 – 40 years. Most of them were educated in high school (41.4%). All workers was health checked up (100%) and most last time them were health checked 3 – 6 months (47.3%) and result of them health checked was normally (61.9%) and most of them were not accident or disease from worked (98.2%).

Table 3: Number and percentages of the items on the respondents by general
characteristics.

Characteristics	Number (n= 336)	Percentage (%)
Gender		
Male	322	95.8
Female	14	4.2
Age group (years)		
21-30	112	33.3
31-40	86	25.6
41-50	133	39.6
≥51	5	1.5
Minimum = 22 Maximum = 53 Mean = 36.58 Median = 35 SD = 9.478		
Education Level		
Secondary school	70	20.8
High school	139	41.4
College	113	33.6
University	14	4.2

Table 3: (continued) Number and percentages of the items on the respondents by

general characteristics

Characteristics	Number (n= 336)	Percentage (%)
Health checked up		
Yes.	336	100
When was the last time you have your health checked		
< 3 months	61	18.2
3 - 6 months	159	47.3
6 - 12 months	103	30.7
≥ 12 months	13	3.9
Result of your health checked		
Normally	208	61.9
Abnormal	128	38.1
Accident or disease from worked per year		
Yes	6	1.8
No	330	98.2
How many accident from worked per year		
0	360	98.2
>1	6	1.8

A.2 Job Characteristics and working experience

This study was most of workers in steel industry were Rolling Mill department (50.3%). The mean and median work experience of workers was 9.18 and 5 years with a standard deviation of 7.349 and most work experience in the years range of 1 - 5 years (53.9%) and most average working time per day in 8 hr. (91.7%). as shown in Table 4.

Table 4: Number and percentages of the respondents by job characteristics and working experience

Characteristics	Number (n= 336)	Percentage (%)
Department		
Scrap Preparation	167	49.7
Rolling Mill	169	50.3
Work Experience		
1 - 5	181	53.9
6 - 14	70	20.8
15 - 26	85	25.3
Minimum = 1 Maximum = 26 Mean = 9.18 Median = 5.00 SD = 7.349		
Average working time per day		
8 hr.	308	91.7
9 hr.	28	8.3

4.2 Knowledge regarding using personal protective equipment

Distribution of knowledge regarding using personal protective equipment of the workers showed that 62.2% of subjects had "Good Knowledge" as well as 33.6% of them had "Moderate Knowledge" while 4.2% had "Poor Knowledge" as shown in Table 5.

Table 5: Distribution of knowledge regarding using personal protective equipment

Knowledge Level	Number (n= 336)	Percentage (%)
Good Knowledge (13-16 scores)	209	62.2
Moderate Knowledge (10-12 scores)	113	33.6
Poor Knowledge (0-9 scores)	14	4.2
Minimum = 8 Maximum = 14 Mean = 12.57 Median = 13.00		SD = 1.307

Questions about knowledge regarding using personal protective equipment. Each correct response was given one mark with a total 16 marks. The mean knowledge score for workers were 12.57. The median knowledge score for workers were 13.00 out of possible 16 points with a standard deviation of 1.307. The range of knowledge score was 8 – 14 as shown in Table 5.

Response for the 16 knowledge part of the questionnaire was summarized in Table 6. 100% of the respondents knew that steel production process can cause harmful effects to your health. (item 1). The questions with the least number of correctly answered were 39.6% of the respondents knew that leather armband protects heat such splashes of hot metals and other hot liquids. (item 15).

Table 6: Number and percentages of the items on the knowledge regarding using
personal protective equipment

Knowledge Items	Correct	
	Number (n= 336)	Percentage (%)
Hazards in steel industry and effect to health and safety		
1. Steel production process can cause harmful effects to your health	336	100
2. Hazards in steel industry such as Accident from machine, Heat, Noise, Illuminate and Chemical etc.	332	98.8
3. Principle PPE in steel process should is Safety helmet, Safety glasses, Safety shoes	162	48.2
4. Personal protective equipment is to reduce workers exposure to hazards	297	88.4
5. Workers was expose noise in long time was loss noise	285	84.5
6. Don't use PPE was unsafe action	292	86.9
The importance of using personal protective equipment		
7. Work with machine safety helmets protects from head injuries	149	44.3
8. Working with noise shout time not necessary use ear plugs or ear muffs	263	78.3
9. Working in non-hazardous area not necessary use safety glasses	292	86.9
10. Sneakers or slippers can take in work in your department	287	85.4
11. Work is concerned chemical should use safety mask.	213	63.4

Table 6: (continued) Number and percentages of the items on the knowledge
regarding using personal protective equipment

Knowledge Items	Correct	
	Number (n= 336)	Percentage (%)
Type of personal protective equipment		
11. Face shield protects splashes from chemical or hot metal.	299	89.0
12. PPE for hearing protective consists of ear plugs and ear muffs	297	88.9
13. Goggles provide better protection than safety glasses, and are effective in preventing an injury from chemical splashes, impact, dusty environments and welding	294	87.5
14. Fire Resistant Coats these protect the body from splashes of hot metals and other hot liquids.	293	87.2
15. Leather armband protects heat such splashes of hot metals and other hot liquids.	133	39.6

4.3 Attitude regarding using personal protective equipment

Table 7: Distribution of the attitude regarding using personal protective equipment

Attitude Level	Number (n= 336)	Percentage (%)
Good Attitude (43 - 60 scores)	78	23.2
Moderate Attitude (38 - 42 scores)	161	47.9
Poor Attitude (0 - 37 score)	97	28.9
Minimum = 28 Maximum = 50 Mean = 39.82	Median = 40.00	SD = 5.103

The workers answered a total of 12 questions with had a total score of 60, questions about attitude regarding using personal protective equipment. Distribution of attitude regarding using personal protective equipment of the workers showed that 47.9% of subjects had "Moderate Attitude" as well as 28.9% of them had "Poor Attitude" while 23.2% had "Good Attitude". The mean and median attitude score for all respondents were 39.82 and 40.00 out of a possible 60 point with a standard deviation of 5.103. The range of attitude score was 28 and 58 respectively as shown in Table 7.

Table 8: Percentages of the items on the attitude regarding using personal protective
        equipment

Attitude Items	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Positive Statements:					
Hazards in steel industry and effect to health and safety					
- In my opinion, Using PPE by company regulation can reduce workers from hazards in steel process	17.6	48.2	34.2	0	0
- In my opinion, Hazards in steel process have heat and noise only	9.8	37.5	31.0	21.7	0
- In my opinion, Personal protective equipment is to reduce workers exposure to hazards	23.5	61.3	8.6	0	6.5
The importance of using personal protective equipment					
- In my opinion, I should not continue working if I lack of PPE	18.5	29.5	39.9	11.9	0.3

Table 8: (continued) Percentages of the items on the attitude regarding using personal protective equipment.

Attitude Items	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Type of personal protective equipment					
- In my opinion, workers are needed to be trained of using PPE	10.1	49.7	31.8	8.3	0
- In my opinion, Use personal protective equipment appropriate to the type of work performed.	7.7	58.6	25.0	8.6	0
- In my opinion, Use personal protective equipment for type of head protection performance.	9.8	50.3	31.5	8.3	0
- In my opinion, Use personal protective equipment types face and eye protection at all times, working with chemicals.	15.2	47.9	28.6	8.3	0

Table 8: (continued) Percentages of the items on the attitude regarding using personal protective equipment.

Attitude Items	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Negative Statements:					
Hazards in steel industry and effect to health and safety					
- In my opinion, PPE is not enough to protect myself from hazards	0	17.3	72.9	9.5	0.3
The importance of using personal protective equipment					
- In my opinion, Using PPE when supervisor or management in my area only	0.9	9.8	36.9	32.4	19.9
- In my opinion, PPE is a waste of money	9.5	4.5	45.2	16.1	24.7
In my opinion, PPE bother me when I am working	5.1	19.3	31.2	31.0	13.4

4.4 Practice of workers about using personal protective equipment to protect themselves from their work

A total of 19 questions with had a total score of 38. Distribution of practice regarding using personal protective equipment of the workers showed that 47.3% of subjects had "Moderate Practice" as well as 31.2% of them had "Poor Practice" while 21.4% had "Good Practice". The mean and median practice score for all respondents were 24.12 and 25.00 out of a possible 38 point with a standard deviation of 4.610. The range of practice score was 11 and 38 respectively as shown in Table 9.

Table 9: Distribution of the practice of workers about using personal protective equipment to protect themselves from their work

Practice Level	Number (n= 336)	Percentage (%)
Good Practice (27-38 scores)	72	21.4
Moderate Practice (21-26 scores)	159	47.3
Poor Practice (0-20 scores)	105	31.2
Minimum = 11 Maximum = 38 Mean = 24.12 Median = 25.00 SD = 4.610		

Table 10. shows percentages of the practice of workers 39.9% that using personal protective equipment to protect themselves from their work, 85.4% of the workers using safety shoes for foot protection (item 17), 81.2% of the workers using helmet for head protection (item 1), and 77.4% of the workers using boots for foot protection (item 18).

The questions with the least number of the practice of workers about using personal protective equipment 0.9% using leather leg for body protection (item 15), 2.1% of the workers using safety harness for body protection (item 16), 17.6% of the workers using chemical clothing for body protection (item 12)

Table 10: Percentages of the practice of workers about using basic personal
protective equipment to protect themselves from their work by items

Practice Items	Never (0)	Sometime (1)	Always (2)
	n (%)	n (%)	n (%)
Have you ever been formally taught or been advised in using personal protective equipment in your work?			
	31 (9.2)	0	305 (90.8)
Basic personal protective equipment			
Head protection (Helmet)	0	63 (18.8)	273 (81.2)
Face and Eye protection (Glasses)	0	171 (50.9)	165 (49.1)
Foot protection (Safety shoes)	32 (9.5)	17 (5.1)	287 (85.4)

Table 11: Percentages of the practice of workers about using specific personal

protective equipment to protect themselves from their work by items

Practice Items	Never (0)	Sometime (1)	Always(2)
	n (%)	n (%)	n (%)
Specific personal protective equipment			
Face and Eye protection (Face Shield)	13 (3.9)	144 (42.9)	179 (53.3)
Face and Eye protection (Goggles)	0	212 63.1)	124 (36.9)
Ear protection (Ear plug)	12 (3.6)	154 (45.8)	170 (50.6)
Ear protection (Ear muff)	14 (4.2)	150 (44.6)	172 (51.2)
Respiratory protection (Chemical masks)	80 (23.8)	151 (44.9)	105 (31.2)
Respiratory protection (Dust masks)	0	123 (36.6)	213 (63.4)
Hand and arm protection (Gloves)	69 (20.5)	120 (35.7)	147 (43.8)
Hand and arm protection (Leather armband)	88 (26.2)	61 (18.2)	187 (55.7)
Body protection (Clothing)	16 (4.8)	66 (19.6)	254 (75.6)
Body protection (Chemical Clothing)	166(49.4)	111 (33.0)	59 (17.6)
Body protection (Heat resistant)	95 (28.3)	97 (28.9)	144 (42.9)
Body protection (Apron)	65 (19.3)	167 (49.7)	104 (31.0)
Body protection (Leather leg)	272(81.0)	61 (18.2)	3 (0.9)
Body and leg protection (Safety harness)	161(47.9)	168 (50)	7 (2.1)
Foot protection (Boots)	17 (5.1)	59 (17.6)	260 (77.4)

Table 12: Percentages of the practice of workers using personal protective

equipment to protect themselves from their work by overall

Practice Items	Never (0)	Sometime (1)	Always (2)
	n (%)	n (%)	n (%)
Practice of workers using personal protective equipment to protect themselves from their work	107 (31.8)	95 (28.3)	134 (39.9)

4.5 The association of practice score between the grouping variables

   The association between socio demographic and practice, knowledge and attitude, knowledge and practice and attitude and practice, chi-square test was used. The results showed all there was statistically significant association (P-value >0.05) as show in the following Tables 13. - 20. provide the details of these tests.

   To association of practice scores between the socio demographic: general characteristics were treated as chi-square test. The results showed all there was statistically significant association (P-value >0.05) as show in the following Tables 13.

Table 13: Distribution of the association between sociodemographic and level of practice among steel industrial workers

Factor	Level of Practice			Chi-square χ^2	P-value
	Poor n (%)	Moderate n (%)	Good n (%)		
Gender					
Male	94 (29.2)	94 (29.2)	134 (41.6)	25.210*	<0.001
Female	13 (3.9)	1 (0.3)	0 (0)		
Age					
21-30 years	49 (14.6)	62 (18.5)	1 (0.3)		
31-40 years	41 (12.2)	23 (6.8)	22 (6.5)	1.867*	<0.001
41-50 years	15 (4.5)	9 (2.7)	109(32.4)		
≥51 years	2 (0.6)	1 (0.3)	2 (0.6)		
Education Level					
Secondary school	38 (11.3)	2 (0.6)	30 (8.9)		
High school	37 (11.0)	40 (11.9)	62 (18.5)	45.990	<0.001
College	25 (7.4)	50 (14.9)	38 (11.3)		
University	7 (2.1)	3 (0.9)	4 (1.2)		

*Fisher's Exact Test

Table 13: (continued) Distribution of the association between sociodemographic and level of practice among steel industrial workers.

Factor	Level of practice			Chi-square χ^2	P-value
	Poor n (%)	Moderate n (%)	Good n (%)		
When was the last time you have your health checked					
< 3 months	29 (8.6)	29 (8.6)	3 (0.9)		
3 - 6 months	47(14.0)	40(11.9)	72(21.4)	60.352*	<0.001
6 - 12 months	21 (6.2)	23(6.8)	59(17.6)		
≥ 12 months	10 (3.0)	3 (0.9)	0		
Result of your health checked					
Normally	71(21.1)	81(24.1)	56(16.7)	45.866	<0.001
Abnormal	36(10.7)	14(4.2)	78(23.2)		
Accident or disease from worked					
Yes.	1 (0.3)	0	5 (1.5)	14.232*	0.001
No.	106(31.5)	95(28.3)	129(38.4)		

*Fisher's Exact Test

To association of practice scores between the socio demographic: job characteristics and working experience were treated as chi-square test. The results showed all there was statistically significant association (P-value >0.05) as show in the following Tables 14.

Table 14: Distribution of the association between job characteristics and working experience and level of practice among steel industrial workers

Factor	Level of practice			Chi-square χ^2	P-value
	Poor n (%)	Moderate n (%)	Good n (%)		
Department					
Scrap Preparation	61(18.2)	56(16.7)	50(14.9)	13.760	0.001
Rolling mill	46(13.7)	39(11.6)	84(25.0)		
Work Experience					
1 – 5 years	74(22.0)	67(19.9)	40(11.9)		
6 – 14 years	26(7.7)	19(5.7)	25(7.4)	85.468	<0.001
15 – 26 years	7(2.1)	9(2.7)	69(20.5)		

To association between level of knowledge and level of attitudes regarding using personal protective equipment by overall were treated as chi-square test. The results showed there was statistically significant association (P-value >0.05) as show in the following Tables 15.

Table 15: Distribution of the association between level of knowledge and level of attitudes regarding using personal protective equipment among steel industrial workers by overall

Factor	Level of Attitude			Chi-square χ^2	P-value
	Poor Attitude n (%)	Moderate Attitude n (%)	Good Attitude n (%)		
Level of Knowledge of using personal protective equipment					
Poor Knowledge	3 (0.9)	1 (0.3)	10 (3.0)		
Moderate Knowledge	42(12.5)	51(47.6)	20 (11.0)	25.445*	<0.001
Good Knowledge	52(15.5)	109 (32.4)	48 (14.3)		

*Fisher's Exact Test

To association of practice scores between the knowledge regarding using personal protective equipment by each component were treated as chi-square test. The results showed there were statistically significant associations (P-value >0.05) was level of knowledge regarding using personal protective equipment: The importance of using personal protective equipment (<0.001) and level of knowledge regarding using personal protective equipment: Type of personal protective equipment (0.015) as show in the following Tables 16.

Table 16: Distribution of the association between level of knowledge regarding using
personal protective equipment and level of practice among steel industrial
workers by each component

| | Level of Practice | | | Chi-square | P-value |
| Factor | Poor | Moderate | Good | χ^2 | |
	n (%)	n (%)	n (%)		
Level of Knowledge regarding using personal protective equipment:					
Hazards in steel industry and effect to health and safety					
Poor Knowledge	0	0	0		
Moderate Knowledge	9 (2.7)	13 (3.9)	7 (2.1)	5.055*	0.080
Good Knowledge	98(29.2)	82(24.4)	127(37.8)		
Level of Knowledge regarding using personal protective equipment:					
The importance of using personal protective equipment					
Poor Knowledge	4 (1.2)	2 (0.6)	0		
Moderate Knowledge	74(22)	28 (8.3)	15 (4.5)	99.484*	<0.001
Good Knowledge	29(8.6)	65(19.3)	119(35.4)		
Level of Knowledge regarding using personal protective equipment:					
Type of personal protective equipment					
Poor Knowledge	1 (0.3)	0	1 (0.3)		
Moderate Knowledge	11(3.3)	17(5.1)	6(1.8)	12.312*	0.015
Good Knowledge	95(28.3)	78(23.2)	127(37.8)		

*Fisher's Exact Test

To association of the level of practices between the levels of knowledges regarding using personal protective equipment by overall were treated as chi-square test. The results showed there was statistically significant association (P-value >0.05) as show in the following Tables 17.

Table 17: Distribution of the association between level of knowledge regarding using personal protective equipment and level of practice among steel industrial workers by overall

Factor	Level of Practice			Chi-square χ²	P-value
	Poor (%)	Moderate (%)	Good (%)		
Level of Knowledge of using personal protective equipment					
Poor Knowledge	11 (3.3)	1 (0.3)	2 (0.6)		
Moderate Knowledge	68(20.2)	34(10.1)	11(3.3)	116.308*	<0.001
Good Knowledge	28 (8.3)	60 (17.9)	121(36.0)		

*Fisher's Exact Test

To association of practice scores between the attitudes regarding using personal protective equipment by each component were treated as chi-square test. The results showed there was statistically significant association (P-value >0.05) as show in the following Tables 18.

Table 18: Distribution of the association between level attitude and level of practice among steel industrial workers by each component

Factor	Level of Practice			Chi-square χ^2	P-value
	Poor (%)	Moderate (%)	Good (%)		
Level of Attitude regarding using personal protective equipment:					
Hazards in steel industry and effect to health and safety					
Poor Attitude	12(3.6)	8(2.4)	33(9.8)		
Moderate Attitude	95(28.3)	76(22.6)	71(21.1)	58.558*	<0.001
Good Attitude	0	11(3.3)	30(8.9)		
Level of Attitude regarding using personal protective equipment:					
The importance of using personal protective equipment					
Poor Attitude	36(10.7)	19(5.7)	65(19.3)		
Moderate Attitude	71(21.1)	33(9.8)	64(19.0)	1.127*	<0.001
Good Attitude	0	43(12.8)	5(1.5)		
Level of Attitude regarding using personal protective equipment:					
Type of personal protective equipment					
Poor Attitude	2(0.6)	5(1.5)	22(6.5)		
Moderate Attitude	45(13.4)	15(4.5)	47(14.0)	36.930	<0.001
Good Attitude	60(17.9)	75(22.3)	65(19.3)		

*Fisher's Exact Test

To association of practice scores between the attitudes regarding using personal protective equipment by overall were treated as chi-square test. The results showed there was statistically significant association (P-value >0.05) as show in the following tables 19.

Table 19: Distribution of the association between level of attitude and level of practice among steel industrial workers by overall.

Factor	Level of Practice			Chi-square χ^2	P-value
	Poor (%)	Moderate (%)	Good (%)		
Level of Attitude regarding using personal protective equipment					
Poor Attitude	43 (12.8)	6 (1.8)	48 (14.3)		
Moderate Attitude	50 (14.9)	29 (8.6)	82 (24.4)	1.283	<0.001
Good Attitude	14 (4.2)	60 (17.9)	4 (1.2)		

The association between socio demographic (age and experience) and practice regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there were a low positive correlation (Spearman's rank correlation coefficient 0.460 and 0.324 respectively, p-value < 0.01) as show in the following Tables 20.

The association between socio demographic (age) and knowledge regarding using personal protective equipment: The importance of using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any positive association (Spearman's rank correlation coefficient 0.145 respectively, p-value < 0.01) as show in the following Tables 20.

The association between socio demographic (age) and attitude regarding using personal protective equipment: Hazards in steel industry and effect to health and safety were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any positive association (Spearman's rank correlation coefficient 0.134 respectively, p-value < 0.05) as show in the following Tables 20.

The association between socio demographic (age) and attitude regarding using personal protective equipment: The importance of using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a low negative association (Spearman's rank correlation coefficient -0.336 respectively, p-value < 0.01) as show in the following Tables 20.

The association between socio demographic (age) and attitude regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.119 respectively, p-value < 0.05) as show in the following Tables 20.

The association between socio demographic (experience) and knowledge regarding using personal protective equipment: Type of personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all was a little if any positive association (Spearman's rank correlation coefficient 0.114 respectively, p-value < 0.05) as show in the following Tables 20.

The association between socio demographic (experience) and attitude regarding using personal protective equipment: Hazards in steel industry and effect to health and safety were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any positive association (Spearman's rank correlation coefficient 0.265 respectively, p-value < 0.01) as show in the following Tables 20.

The association between knowledge regarding using personal protective equipment: Hazards in steel industry and effect to health and safety and attitude regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.215 respectively, p-value < 0.01) as show in the following Tables 20.

The association between knowledge regarding using personal protective equipment: The importance of using personal protective equipment and practice regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a moderate positive association (Spearman's rank correlation coefficient 0.513 respectively, p-value < 0.01) as show in the following Tables 20.

The association between knowledge regarding using personal protective equipment and practice regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a low positive association (Spearman's rank correlation coefficient 0.494 respectively, p-value < 0.01) as show in the following Tables 20.

The association between knowledge regarding using personal protective equipment: Hazards in steel industry and effect to health and safety and attitude regarding using personal protective equipment: Hazards in steel industry and effect to health and safety were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.215 respectively, p-value < 0.01) as show in the following Tables 20.

The association between knowledge regarding using personal protective equipment: The importance of using personal protective equipment and attitude regarding using personal protective equipment: The importance of using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any positive association (Spearman's rank correlation coefficient 0.113 respectively, p-value < 0.05) as show in the following Tables 20.

The association between Knowledge regarding using personal protective equipment: Hazards in steel industry and effect to health and safety and attitude regarding using personal protective equipment: Type of personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.186 respectively, p-value < 0.01) as show in the following Tables 20.

The association between knowledge regarding using personal protective equipment and attitude regarding using personal protective equipment: Type of personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.164 respectively, p-value < 0.01) as show in the following Tables 20.

The association between attitude regarding using personal protective equipment: Type of personal protective equipment and practice regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.199 respectively, p-value < 0.01) as show in the following Tables 20.

The association between attitude regarding using personal protective equipment and practice regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a little if any negative association (Spearman's rank correlation coefficient -0.127respectively, p-value < 0.05) as show in the following Tables 20.

Table 20: Spearman's correlation table

	Age	Experience	Knowledge of • Hazards in steel industry and effect to health and safety	Knowledge of • The importance of using personal protective equipment	Knowledge of • Type of personal protective equipment	Knowledge	Attitude of • Hazards in steel industry and effect to health and safety	Attitude of • The importance of using personal protective equipment	Attitude of • Type of personal protective equipment	Attitude
Age										
Experience	.734**									
Knowledge of • Hazards in steel industry and effect to health and safety	-0.069	-0.054								
Knowledge of • The importance of using personal protective equipment	.145**	0.095	0.005							
Knowledge of • Type of personal protective equipment	0.008	.114*	0.1	0.007						
Knowledge	0.077	0.037	.383**	.860**	.315**					
Attitude of • Hazards in steel industry and effect to health and safety	.134*	.265**	-.215**	0.042	-0.035	-0.068				
Attitude of • The importance of using personal protective equipment	-.336**	-0.099	-0.059	.113*	-0.088	0.101	.150**			
Attitude of • Type of personal protective equipment	0.034	0.1	-.186**	-0.094	-0.035	-.164**	.400**	0.07		
Attitude	-.119*	0.062	-.215**	0.065	-0.1	-0.03	.639**	.578**	.777**	
Practices	.460**	.324**	0.039	.513**	0.039	.494**	0.068	-0.062	-.199**	-.127*

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

* Correlation is significant at the 0.05 level (2-tailed)

CHAPTER V

DISCUSSION

The purpose of this study was to evaluate the knowledge, attitude and practice associated with personal protective equipment use among steel industry workers in Thailand. The study population of this study is 350 workers from 2 departments who work in Scrap Preparation department and Rolling Mill department in steel industry, Rayong Province, Thailand. The total respondents were 336 participants (96%), indicating good intension to participate in this study. In this chapter, a brief description of the major findings and their significance to practice will be discussed with it is limitations. It will conclude with recommendations for further research.

5.1 Socio demographic

5.1.1 General characteristics

In this study, the result shown that approximately 95.8% of workers was male and 4.2% was female. There was significance association between gender and a practice towards protective equipment at the 0.05 level. (p-value <0.001) (Pattamung P, 2003)

This study revealed the age ranged from 22 to 53 years and the average age was 36.58 years. The median the age of workers was 35 years with a standard deviation of 7.349. Most of workers (39.6%) were in the age range of 41 – 50 years. These finding are similar to (Tinnasulanon A, 2003) it showed 37.5 % was from 40 years old up. There were significance association between age and a practice towards personal protective equipment at the 0.05 level. (p-value <0.001) (Pattamung P, 2003)

In this study, most of workers (41.4%) had educated in high school. There were significance association between education and a practice towards personal protective equipment at the 0.05 level. (p-value <0.001) (Pattamung P, 2003)

In this study, most of workers (47.3%) had the last time themes health checked of 3 - 6 months. There were significance association between last time themes health check up and a practice towards personal protective equipment at the 0.05 level (p-value <0.001)

In this study, most of workers (61.9%) had the normally result of themes health check up. There were significance association between the result of themes health check up and a practice towards personal protective equipment at the 0.05 level (p-value <0.001)

In this study, most of workers (98.2%) did not get accident or disease from worked. There is significance association between accident and disease from worked and a practice towards personal protective equipment at the 0.05 level. (p-value 0.001)

5.1.2 Job characteristics

This study was most of workers in steel industry of Rolling Mill department (50.3%). The mean and median work experience of workers was 9.18 and 5 years with a standard deviation of 7.349 and most work experience in the years range of 1 - 5 years (53.9%) and most average working time per day in 8 hr. (91.7%).

This study was most of workers in steel industry were hazards that workers normally exposed to noise and dust (100%), heat (98.5%).

There were significance association between department and a practice towards personal protective equipment at the 0.05 level. (p-value 0.001)

There were significance association between working experience and a practice towards personal protective equipment at the 0.05 level. (p-value <0.001)

5.2 Knowledge on using personal protective equipment

The mean and median knowledge score was found 12.57 and 13 from possible 16 points with a standard deviation of 1.307. Distribution of knowledge regarding using personal protective equipment of the workers showed that 62.2% of subjects had "Good Knowledge"

There were no significance association between level of knowledge regarding using personal protective equipment: Hazards in steel industry and effect to health and safety and level of practice towards personal protective equipment at the 0.05 level. (p-value 0.080)

There were significance association between level of knowledge regarding using personal protective equipment: The importance of using personal protective equipment and level of practice towards personal protective equipment at the 0.05 level. (p-value <0.001)

There were significance association between level of knowledge regarding using personal protective equipment: Type of personal protective equipment and level of practice towards personal protective equipment at the 0.05 level. (p-value 0.015)

There were significance association between level of knowledge on using personal protective equipment and level of practice towards personal protective equipment at the 0.05 level. (p-value <0.001)   (Pattamung P, 2003) and that knowledge and attitude had association with statistically significant at the level of 0.05 (p-value 0.000) (Tinnasulanon A, 2003)

5.3 Attitude on using personal protective equipment

The mean and median attitude score for all workers were 39.82 and 40.00 from answered a total of 12 questions with had a total score of 60, with a standard deviation of 5.103. The workers questions about attitude regarding using personal protective equipment. Distribution of attitude regarding using personal protective equipment of the workers showed that 47.9% of subjects had "Moderate Attitude".

It was found that attitude on using personal protective equipment and a practice towards personal protective equipment had association with statistically significant at the level of 0.05 (p-value 0.000) (Tinnasulanon A, 2003)

5.4 Practice on using personal protective equipment

The percentages of the practice of workers 39.9% that using personal protective equipment to protect themselves from their work. The mean and median practice score for all workers were 24.12 and 25 from total of 19 questions with had a total score of 38, with a standard deviation of 4.610. Distribution of practice regarding using personal protective equipment of the workers showed that 47.3% of subjects had "Moderate Practice".

The percentage of the practice of workers that using basic personal protective equipment (helmet, glasses and safety shoes) this study were 81.2, 49.1 and 85.4 to protect themselves from their work. However workers should using basic personal protective equipment 100% as follow by policy company.

There were significance association between knowledge on using personal protective equipment and a practice towards personal protective equipment at the 0.05 level. (p-value <0.001) (Pattamung P, 2003)

5.5 The association between knowledge and attitude, knowledge and practice, and attitude and practice

In this study, level of practice on using personal protective equipment was significant association with all of the socio-demographic characteristics were treated as chi-square test, gender ($p<0.001$), age ($p<0.001$), education level ($p<0.001$), department ($p<0.001$), working experience ($p<0.001$) If the workers were received add knowledge about hazards of steel industry, they have more practice on using personal protective equipment. The elder workers can learn self–protecting knowledge from experiences in their work. (Pattamung P, 2003)

The result also showed that level of attitude on using personal protective equipment was significant association with level of practice. The workers was been build awareness in safety as there have positive attitude to safe behavior about using personal protective equipment to protect themselves from their work (Wimonthumrong J, 1995) and If more compliance, identification or influenced by their family, colleague, supervisor or management because of their internalization which were likely to be adjusted the attitude of individuals. (Pattamung P, 2003)

The result also showed that level of knowledge on using personal protective equipment was significant association with level of practice, if more compliance, identification or influenced by their family, college, supervisor or management because of their internalization which were likely to be adjusted the attitude of individuals. Employers should provide PPE training as well as the ability to properly use PPE before they are allowed to perform work requiring the use of the PPE and that workers should be retraining and practice. (Pattamung P, 2003) The result also showed that level of attitude on using personal protective equipment was significant association with level of knowledge. (Tinnasulanon A, 2003)

According the results on socio-demographic, (age and experience) and practice regarding using personal protective equipment were treated as Spearman's rank correlation coefficients. The results showed all there was a low positive association (Spearman's rank correlation coefficient 0.460 and 0.324 respectively, p-value < 0.01). Shown that workers had difference age and experience, were direct impact with practice regarding using personal protective equipment. If new worker received experience from old worker, there might have increase of a practice regarding using personal protective equipment.

The result also showed that the association between knowledge and attitude on using personal protective equipment were not correlation (Spearman's rank correlation coefficient -0.03 respectively, p-value < 0.01).

The result also showed that the association between knowledge and practice on using personal protective equipment were a little positive correlation (Spearman's rank correlation coefficient 0.494 respectively, p-value < 0.01). Shown that workers had difference knowledge, were direct impact with practice regarding using personal protective equipment. If worker received knowledge about the importance of using personal protective equipment by training, on the job training or college, there might have increase of a practice regarding using personal protective equipment.

The result also showed that the association between attitude and practice on using personal protective equipment were little if any negative correlation (Spearman's rank correlation coefficient -1.27 respectively, p-value < 0.05). Shown that workers had difference attitude, were indirect impact with practice regarding using personal protective equipment. If worker had positive attitude about type of personal protective equipment, there might have increase of a practice regarding using personal protective equipment. Accordingly employer should establish a activity to promote positive attitude about protect themselves from their work regarding using personal protective equipment.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Conclusions

The assessment of the level of knowledge, attitude and practice on using personal protective equipment (PPE) in steel industry workers, Thailand according to protect them from the hazards in steel industry and affect to health and safety that the questionnaire was completed by face to face interviewing from 336 workers who are working in Scrap Preparation department and Rolling mill department period May - June, 2016 by use questionnaire that had been validity were the test which measures the desired performance and appropriate inferences can be drawn from the results. The assessment accurately reflects the learning it was designed to measure. Content validity was ensured by taking suggestions from qualified persons. The questionnaire was amended according to the suggestions and was reliability were the measure of consistency for an assessment instrument. The instrument should yield similar results over time with similar populations in similar circumstances to ensure reliability, the questionnaire was pre-tested before the actual data collection began, with 30 workers who are supervisor, operator and contractor position in Scrap preparation department and Rolling mill department in steel industry at Chonburi Province and the internal consistency was analyzed by using Cronbach's Alpha Coefficient. Upon analysis, the Cronbach's Alpha result was 0.729 for knowledge part, 0.740 for attitude part, and 0.782 for practice part. The overall Cronbach's Alpha Coefficient value was 0.782. The licensed SPSS software for windows version 16 was used in analysis. Frequency tables of demographic characteristics, knowledge, attitudes and practices were tabulated. Chi square test and Spearman's rank correlation was applied to test association between knowledge and attitude, knowledge and practice, and attitude and practice.

The purpose of the study was to establish whether personal protective equipment was used effectively, and to determine the knowledge about hazards in steel industry and effect to health and safety, the importance of using personal protective equipment, type of personal protective equipment and attitude of using personal protective equipment hazards in steel industry and effect to health and safety, the importance of using personal protective equipment, type of personal protective equipment. The following conclusions were drawn from the findings: The workers demonstrated that they had knowledge about personal protective equipment. There was an appropriate response to the majority of the questions in relation to knowledge about personal protective equipment. They showed level of knowledge of personal protective equipment was although "Good Knowledge" They showed level of attitude of personal protective equipment was although "Moderate Attitude"

The results this research showed that overview 39.9% of workers using personal protective equipment. Most of them were using head protection (helmet) (90.63%), foot protection (safety shoes) (87.95%) and foot protection (boots) (86.16%). Least of them using body protection (leather leg) (9.97%), body protection (safety harness) (27.98%) and body protection (chemical clothing) (34.08%).

The percentage of the practice of workers that using basic personal protective equipment (helmet, glasses and safety shoes) this study were 81.2, 49.1 and 85.4 to protect themselves from their work. However workers should using basic personal protective equipment 100% as follow by policy company.

Chi square test was applied to test association between knowledge and attitude, knowledge and practice, and attitude and practice in this analysis a p-value of less than 0.05 was considered to be statistical significant and Spearman's rank correlation was applied to test association between knowledge and attitude were not correlation, knowledge and practice were a little positive correlation, and attitude and practice were little if any negative correlation. (Spearman's rank correlation coefficient 0.494 and -0.127 respectively, p-value < 0.01).

6.2 Recommendations and suggestions

Using safety practices, it would be helpful to improve better occupational health and safety of life among steel industry workers in Thailand in general, personal protective equipment (PPE) like Body protection (leather leg, safety harness, chemical clothing), were not accepted by the workers due to improper fitting and hindrance of their work efficiency. Thus, there was a need for improving these. Meanwhile, all the workers should be trained in the use of personal protective equipment. An appropriated policy on the basis of the findings in this study, the issues should be considered for improving knowledge of age, new workers of harmful effects of steel industry before them worked. Workers need more information and education as to the long term effects that failure to wear personal protective equipment could have on their health. Most recognize that rules exist to protect their wellbeing, but seem unsure about what exactly they should be protecting themselves from - a lack of knowledge that could place life in danger. Comfort is a key issue and one that needs to be addressed. Workers are less likely wear PPE on every job if it is not comfortable. This means that they could be tempted to cut corners and leave it off if they are on a short job. Workers also stated that they want PPE to be easier to get hold of and, critically, that they need to have better training. The workers, highlighting comfort as the main issue that needs to be addressed, in order to encourage more workers to wear PPE at all times when working on site. They also felt that it should be enforced more strongly and importance of using personal protective equipment at work is following and:

1. Public education is necessary to address the knowledge gap revealed in the study. Therefore educational programs should be organized for improving knowledge about harmful effects of steel industry and it should focus mainly on increasing the awareness of the people of the importance of using personal protective equipment.

2. The study of this issue on the use of personal protective equipment. There are differences in the request workers 10 years of experience to cooperate on personal protective equipment and the importance of using such personal protective equipment that means workers who are highly experienced, knowledgeable and skilled in the use of personal protective equipment. If there were a perceived risk and avoid using the personal protective equipment. Management should be provided or learning forum use of personal danger and convey to those who have little work experience to increase safety at steel work.

3. Companies should organize activities for workers to achieve cooperation and awareness of the importance of strengthening the safe of working for themselves and their colleagues.

4. Most employees trained but there are still some groups of employees not trained. Companies should provide training about the hazards in steel industry and effect to health and safety to raise awareness of safety even further and should be trained repeatedly in the past training to remind the safety even more.

5. Companies should provide employees with additional knowledge in building management behavior. Safe behavior at the workplace promoting safety in the workplace

6. Companies should make sure that each worker demonstrates an understanding of the personal protective equipment training as well as the ability to properly wear and use personal protective equipment before they are allowed to perform work requiring the use of the personal protective equipment. If an employer believes that a previously trained workers is not demonstrating the proper understanding and skill level in the use of PPE, that workers should receive retraining. Other situations that require additional or retraining of workers include the following circumstances: changes in the workplace or in the type of required PPE that make prior training obsolete.

7. Management should also reflect the intensity of use and wear personal protective equipment is a good role model to further improve safety performance of the organization, as it is convinced that almost all accidents are attributed by human behavior.

6.3 Limitations of the study

1. Workers were interviewed about practice towards personal protective equipment but they not were observed behavior. It might not true practice.

2. The biases of interviewed should also be recognized because the workers may not tell the truth to the researcher.

6.4 Recommendations for further study

1. Studies in other factors affecting the using personal protective equipment etc. study association between condition and lifetime of personal protective equipment and level of practice among steel industrial workers.

2. Study workers practice towards personal protective equipment after and before received knowledge of using personal protective equipment.

3. Study workers practice towards personal protective equipment after and before had activity establish awareness of attitude of using personal protective equipment.

4. Qualitative Research that observes behavior workers is using personal protective equipment by real practice

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APPENDIX

APPENDIX A

QUESTIONNAIRE (English version)

Survey objective: To investigate the knowledge, attitude and practice on using personal protective equipment of employees and sub-contractors related to worked on hazards in Steel Industry

Code: . . . .   Date: . . . . / 05 / 2016

Information to read to respondent:

We wish to learn about your knowledge, attitude and practice regarding to using personal protective equipment to reduce health and safety effect from hazards in your work. We hope to understand your knowledge, attitudes and practices about that. The information you provide will be used to raise awareness, give some recommendations and guidelines for decrease diseases and accident related to steel process in your work.

Your answers will not be released to anyone and will remain anonymous.

Thank you for your assistance.

Interviewer: Place an X in the box ☐ of the selected answer(s).

Do not read responses unless the directions indicate.

A. Socio demographic questions

Part A.1 General Characteristics

Q1. What is your gender?

    1. ☐ Male   2. ☐ Female

Q2. How old are you? : .... (years)

Q3. What is the highest level of education you have completed?

    1. ☐ No school, Literacy classes only

    2. ☐ Primary school

3. ☐ Secondary school

4. ☐ High school

5. ☐ College

6. ☐ University

7. ☐ Other...................

Q4. Do you have periodic health checked up?

1. ☐ Yes   2. ☐ No **(Go to Q7.)**

Q5. If yes, when was the last time you have your health checked?

1. ☐ < 3 months   2. ☐ 3 - 6 months

3. ☐ 6 - 12 months   4. ☐ ≥ 12 months

Q6. Result of your health checked?

1. ☐ Normally   2. ☐ Abnormal (please specify)...................................

Q7. Do you get accident or disease from worked?

1. ☐ Yes (please specify) .... 2. ☐ No **(Go to Q9.)**

Q8. If yes, how many accident from worked per year? . . . .(Year)

Part A.2 Job Characteristics and working experience

Q9. Department

1. ☐ Scrap Preparation   2. ☐ Rolling mill

Q10. Position

1. ☐ Supervisor   2. ☐ Operator   3. ☐ Contractor

Q11.Work Experience .... Years.

Q12. Average working time per day .... Hr.

Q13. Hazards that they normally expose to **(You may check more than one)**

1. ☐ Accident from machine 2. ☐ Noise 3. ☐ Heat

4. ☐ Illuminate 5. ☐ Dust 6. ☐ Chemical

7. ☐ Splashes 8. ☐ CO 9. ☐ Other ....

B. Knowledge.

Q14. Steel production process can cause harmful effects to your health do you know that?

1. ☐ Yes 2. ☐ No

Q15. In your opinion, the following things are true or false.

Please stick ☑ True or False

No.	Statement	True	False
1	Hazards in steel industry such as Accident from machine, Heat, Noise Illuminate and Chemical etc.		
2	Principle PPE in steel process should is Safety helmet, Safety glasses, Safety shoes		
3	Personal protective equipment is to reduce workers exposure to hazards		
4	Workers was expose noise in long time was loss noise		
5	Don't use PPE was unsafe action		
6	Work with machine safety helmets protects from head injuries		
7	Working with noise shout time not necessary use ear plugs		

	or ear muffs		
8	Working in non-hazardous area not necessary use safety glasses		
9	Sneakers or slippers can take in work in your department		
10	Work is concerned chemical should use safety mask.		
11	Face shield protects splashes from chemical or hot metal.		
12	PPE for hearing protective consists of ear plugs and ear muffs		
13	Goggles provide better protection than safety glasses, and are effective in preventing an injury from chemical splashes, impact, dusty environments and welding		
14	Fire Resistant Coats these protect the body from splashes of hot metals and other hot liquids.		
15	Leather armband protects heat such splashes of hot metals and other hot liquids.		

C. Attitude.

Q16. What is your opinion with this statement:

No.	Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	In my opinion, Using PPE by company regulation can reduce workers from hazards in steel process					
2	In my opinion, PPE is not enough to protect myself from hazards					
3	In my opinion, Hazards in steel process have heat and					

No.	Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	noise only					
4	In my opinion, Personal protective equipment is to reduce workers exposure to hazards					
5	In my opinion, Using PPE when supervisor or management in my area only					
6	In my opinion, PPE is a waste of money					
7	In my opinion, PPE bother me when I am working					
8	In my opinion, I should not continue working if I lack of PPE					
No.	Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
9	In my opinion, workers are needed to be trained of using PPE					
10	In my opinion, Use personal protective equipment appropriate to the type of work performed.					
11	In my opinion, Use personal protective equipment for type of head protection performance.					
12	In my opinion, Use personal protective equipment types					

	face and eye protection at all times, working with chemicals.					

D. Practice.

Q17. Have you ever been formally taught or been advised in using personal protective equipment in your work?

        1. ☐ Ever   2. ☐ Never

Q18. Do you use any kind of personal protective equipment as shown below while you are working in Scrap preparation department and Rolling mill department?

No.	Content	Never	Sometime	Always
1	Head protection (Helmet)			
2	Face and Eye protection (Face Shield)			
3	Face and Eye protection (Goggles)			
4	Face and Eye protection (Glasses)			
5	Ear protection (Ear plug)			
6	Ear protection (Ear muff)			
7	Respiratory protection (Chemical masks)			
8	Respiratory protection (Dust masks)			
9	Hand and arm protection (Gloves)			
10	Hand and arm protection (Leather armband)			
11	Body protection (Clothing)			

12	Body protection (Chemical Clothing)			
13	Body protection (Heat resistant)			
14	Body protection (Apron)			
15	Body protection (Leather leg)			
16	Body and leg protection (Safety harness)			
17	Foot protection (Safety shoes)			
18	Foot protection (Boots)			

Thank you very much for participating in our research

บันทึกข้อความ

ส่วนงาน คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 โทร.0-2218-3202

ที่ จว 416 /2559   **วันที่** 16 พฤษภาคม 2559

เรื่อง แจ้งผลผ่านการพิจารณาจริยธรรมการวิจัย

เรียน คณบดีวิทยาลัยวิทยาศาสตร์สาธารณสุข

สิ่งที่ส่งมาด้วย เอกสารแจ้งผ่านการรับรองผลการพิจารณา

       ตามที่นิสิต/บุคลากรในสังกัดของท่านได้เสนอโครงการวิจัยเพื่อขอรับการพิจารณาจริยธรรมการวิจัย กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย นั้น ในการนี้ กรรมการผู้ทบทวนหลักได้เห็นสมควรให้ผ่านการพิจารณาจริยธรรมการวิจัยได้ ดังนี้

       โครงการวิจัยที่ 016.1/59 เรื่อง ความรู้ ทัศนคติ และการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย (KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS PERSONAL PROTECTIVE EQUIPMENT USE AMONG STEEL INDUSTRY WORKERS IN THAILAND) **ของ นางกุลิสรา กระลาม**

       จึงเรียนมาเพื่อโปรดทราบ

(ผู้ช่วยศาสตราจารย์ ดร.นันทรี ชัยชนะวงศาโรจน์)
กรรมการและเลขานุการ
คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน
กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย

เรียน ท่านรองฯ (รศ.ดร.รัตนา)
เพื่อโปรดพิจารณา
-สำเนา ผอ.ฝ่ายวิชาการ

วันที่ 23 พ.ค. 2559 เวลา 16:22

AF 01-12

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย

254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330

โทรศัพท์/โทรสาร: 0-2218-3202 E-mail: eccu@chula.ac.th

COA No. 094/2559

ใบรับรองโครงการวิจัย

โครงการวิจัยที่ 016.1/59	:	ความรู้ ทัศนคติ และการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความ
		ปลอดภัยส่วนบุคคลของผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย
ผู้วิจัยหลัก	:	นางกุลิสรา กระลาม
หน่วยงาน	:	วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย
ได้พิจารณา โดยใช้หลัก ของ The International Conference on Harmonization – Good Clinical Practice
(ICH-GCP) อนุมัติให้ดำเนินการศึกษาวิจัยเรื่องดังกล่าวได้

ลงนาม..   ลงนาม..
(รองศาสตราจารย์ นายแพทย์ปรีดา ทัศนประดิษฐ)   (ผู้ช่วยศาสตราจารย์ ดร.นันทรี ชัยชนะวงศาโรจน์)
                ประธาน   กรรมการและเลขานุการ

วันที่รับรอง : 11 พฤษภาคม 2559   **วันหมดอายุ** : 10 พฤษภาคม 2560

เอกสารที่คณะกรรมการรับรอง

1) โครงการวิจัย
2) ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัยและใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3) ผู้วิจัย   เลขที่โครงการวิจัย...... 016.1/59
4) แบบสอบถาม   วันที่รับรอง...... 11 พ.ค. 2559
                                     วันหมดอายุ...... 10 พ.ค. 2560

<u>เงื่อนไข</u>

1. ข้าพเจ้ารับทราบว่าเป็นการผิดจริยธรรม หากดำเนินการเก็บข้อมูลการวิจัยก่อนได้รับการอนุมัติจากคณะกรรมการพิจารณาจริยธรรมการวิจัยฯ
2. หากใบรับรองโครงการวิจัยหมดอายุ การดำเนินการวิจัยต้องยุติ เมื่อต้องการต่ออายุต้องขออนุมัติใหม่ล่วงหน้าไม่ต่ำกว่า 1 เดือน พร้อมส่งรายงาน
   ความก้าวหน้าการวิจัย
3. ต้องดำเนินการวิจัยตามที่ระบุไว้ในโครงการวิจัยอย่างเคร่งครัด
4. ใช้เอกสารข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย ใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และเอกสารเชิญเข้า
   ร่วมวิจัย (ถ้ามี) **เฉพาะที่ประทับตราคณะกรรมการเท่านั้น**
5. หากเกิดเหตุการณ์ไม่พึงประสงค์ร้ายแรงในสถานที่เก็บข้อมูลที่ขออนุมัติจากคณะกรรมการ ต้องรายงานคณะกรรมการภายใน 5 วันทำการ
6. หากมีการเปลี่ยนแปลงการดำเนินการวิจัย ให้ส่งคณะกรรมการพิจารณารับรองก่อนดำเนินการ
7. โครงการวิจัยไม่เกิน 1 ปี ส่งแบบรายงานสิ้นสุดโครงการวิจัย (AF 03-12) และบทคัดย่อผลการวิจัยภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น สำหรับ
   โครงการวิจัยที่เป็นวิทยานิพนธ์ให้ส่งบทคัดย่อผลการวิจัย ภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น

ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย

ชื่อโครงการวิจัย ความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัย
ส่วนบุคคลของผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย
ชื่อผู้วิจัย นางกุลิสรา กระลาม ตำแหน่ง ที่ปรึกษาอาวุโส ด้านอาชีวอนามัยและความปลอดภัย
สถานที่ติดต่อผู้วิจัย (ที่ทำงาน) บริษัท เอ็นพีซี เซฟตี้ แอนด์ เอ็นไวรอนเมนทอล เซอร์วิส จำกัด
    (ที่บ้าน) 11/2 ซ.ข้างอำเภอ 4 ถนนตากสินมหาราช ต.เชิงเนิน อ.เมือง จ.ระยอง 21000
    โทรศัพท์ (ที่ทำงาน) ...038-977777.........ต่อ ....7763... โทรศัพท์ที่บ้าน ....-...............
    โทรศัพท์มือถือ 085-398-3018   E-mail : Kulitsara.k@npc-se.co.th

1. ขอเรียนเชิญท่านเข้าร่วมในการวิจัยก่อนที่ท่านจะตัดสินใจเข้าร่วมในการวิจัย มีความจำเป็นที่
ท่านควรทำความเข้าใจว่างานวิจัยนี้ทำเพราะเหตุใด และเกี่ยวข้องกับอะไร กรุณาใช้เวลาในการอ่านข้อมูล
ต่อไปนี้อย่างละเอียดรอบคอบ และสอบถามข้อมูลเพิ่มเติมหรือข้อมูลที่ไม่ชัดเจนได้ตลอดเวลา

2. โครงการนี้เป็นการวิจัยเกี่ยวกับการศึกษาความสัมพันธ์ระหว่างความรู้ ทัศนคติและการใช้
อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของพนักงาน ด้วยการสัมภาษณ์ความรู้ ทัศนคติและการใช้
อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของพนักงานในอุตสาหกรรมเหล็ก

3. รายละเอียดของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย

- กลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัยครั้งนี้ คือนี้ คือพนักงานฝ่ายผลิตของโรงงาน
  อุตสาหกรรมเหล็กโดยปฏิบัติงานในตำแหน่งปฏิบัติการ, หัวหน้างาน และผู้รับเหมา ซึ่งเป็น
  พนักงานในหน่วยงานฝ่ายผลิตโรงหลอมและฝ่ายผลิตโรงรีด ซึ่งเป็นหน่วยงานที่มีสถิติการเกิด
  อุบัติเหตุสูงสุดในบริษัท 2 หน่วยงาน โดยมีเกณฑ์การคัดเข้า คือ ปัจจุบันปฏิบัติงานเป็น
  พนักงานในตำแหน่งปฏิบัติการ, หัวหน้างาน และผู้รับเหมา ในหน่วยงานฝ่ายผลิตโรงหลอมและ
  ฝ่ายผลิต โรงรีด และเกณฑ์การคัดออก คือ ปฏิบัติงานเป็นพนักงานในตำแหน่งปฏิบัติการ,
  หัวหน้างาน และผู้รับเหมา ในหน่วยงานอื่น หรือ ไม่ได้ปฏิบัติงานในช่วงที่มีการเข้าไปสัมภาษณ์
  โดยเป็นผู้มีส่วนร่วมในการวิจัยในครั้งนี้เท่านั้น

- มีจำนวนทั้งหมด 350 คน
  หน่วยงานฝ่ายผลิตโรงหลอม จำนวน 174 คน
  หน่วยงานฝ่ายผลิตโรงรีด จำนวน 176 คน

- ในการศึกษาครั้งนี้เลือกผู้มีส่วนร่วมในการวิจัยจากกลุ่มประชากร โดยใช้วิธีการเลือกกลุ่ม
  ประชากรทั้งหมดมาเป็นผู้มีส่วนร่วมในงานวิจัย

AF 04-07

    4. กระบวนการการวิจัยที่กระทำต่อกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัยคือ ผู้วิจัยหลัก หรือผู้ช่วยวิจัยเป็นผู้สัมภาษณ์ท่าน โดยเป็นการสัมภาษณ์ข้อมูลเกี่ยวกับความรู้ ทัศนคติและวิธีการใช้ อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของท่าน ซึ่งใช้เวลาในการสัมภาษณ์ ประมาณ 10 นาที ในระหว่างเวลาพักงาน พักทานข้าว หรือหลังเลิกงาน ซึ่งผู้วิจัยและผู้ช่วยจะเข้าสัมภาษณ์ท่านและจะให้ คำแนะนำการปฏิบัติตนในการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลที่เหมาะสม เมื่อเสร็จสิ้นการ วิจัยแล้ว ข้อมูลที่เกี่ยวข้องกับผู้มีส่วนร่วมในการวิจัยจะมีการทำลายแบบสัมภาษณ์และ ไม่มีการ บันทึกเสียงในระหว่างการสัมภาษณ์

    5. ภายหลังการสัมภาษณ์แล้ว ผู้วิจัยจะอธิบายและให้ความรู้เกี่ยวกับการใช้อุปกรณ์คุ้มครอง ความปลอดภัยส่วนบุคคลที่ถูกต้องให้แก่พนักงาน เพื่อให้เกิดความรู้ในการปฏิบัติตนเกี่ยวกับการใช้ อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลให้มีความปลอดภัยในการทำงาน

    6. การศึกษาครั้งนี้เป็นการสัมภาษณ์ผู้มีส่วนร่วมในวิจัยเท่านั้น จึงไม่มีอันตรายหรือความเสี่ยงที่ อาจเกิดขึ้นแก่กลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย

    7. ประโยชน์ในการเข้าร่วมวิจัยในครั้งนี้ คือ ทำให้ทราบถึงความสัมพันธ์ระหว่างความรู้ ทัศนคติและการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของพนักงาน และบริษัทได้ทราบถึงแนวทาง ในการจัดการฝึกอบรมในด้านความปลอดภัย เพื่อให้เกิดการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล ของพนักงานให้สอดคล้องและเหมาะสมกับความเสี่ยงของแต่ละกิจกรรมในการทำงาน เพื่อเป็นแนวทาง ในการลดอุบัติเหตุจากการทำงาน

    8. การเข้าร่วมในการวิจัยของท่านเป็นโดยสมัครใจ และสามารถปฏิเสธที่จะเข้าร่วมหรือถอนตัว จากการวิจัยได้ทุกขณะ โดยไม่ต้องให้เหตุผลและไม่สูญเสียประโยชน์ที่พึงได้รับ ซึ่งการตอบแบบสัมภาษณ์ นี้จะไม่มีผลกระทบต่อการทำงานของท่านแต่อย่างใด

    9. ข้อมูลที่เกี่ยวข้องกับท่านจะเก็บเป็นความลับ หากมีการเสนอผลการวิจัยจะเสนอเป็นภาพรวม ข้อมูลใดที่สามารถระบุถึงตัวท่านได้จะไม่ปรากฏในรายงาน

    10. หลังจากสัมภาษณ์ผู้วิจัยจะมีการมอบของที่ระลึกเป็นปากกา ซึ่งมีมูลค่าประมาณ 20 บาท ให้กับผู้มีส่วนร่วมในการวิจัยทุกท่าน

    11. "หากท่านไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าวสามารถร้องเรียนได้ที่ คณะกรรมการ พิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202 E-mail: eccu@chula.ac.th"

เลขที่โครงการวิจัย 016.1/59

วันที่รับรอง 11 พ.ค. 2559

วันหมดอายุ 10 พ.ค. 2560

AF05-07

หนังสือแสดงความยินยอมเข้าร่วมการวิจัย

ทำที่...

วันที่............เดือน...................พ.ศ. ....

เลขที่ ประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย.......................

ข้าพเจ้า ซึ่งได้ลงนามท้ายหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย

ชื่อโครงการวิจัย ความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของ

ผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS

PERSONAL PROTECTIVE EQUIPMENT USE AMONG STEEL INDUSTRY WORKERS IN THAILAND,

ชื่อผู้วิจัยนางกุลิสรา กระลาม ที่อยู่ที่ติดต่อ บ. เอ็นพีซี เซฟตี้ แอนด์ เอ็นไวรอนเมนทอล เซอร์วิส จำกัด

โทรศัพท์ 085-398-3018

ข้าพเจ้า ได้รับทราบรายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่
จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดยได้อ่าน
รายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด และได้รับคำอธิบายจากผู้วิจัย จนเข้าใจเป็นอย่างดีแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมในโครงการวิจัยนี้ ตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย โดยข้าพเจ้า
ยินยอมให้สัมภาษณ์ข้อมูลเกี่ยวกับความรู้ ทัศนคติและวิธีการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของ
ข้าพเจ้า ซึ่งใช้เวลาในการสัมภาษณ์ ประมาณ 10 นาที ในระหว่างเวลาพักงาน พักทานข้าว หรือหลังเลิกงาน

ข้าพเจ้ามีสิทธิถอนตัวออกจากการวิจัยเมื่อใดก็ได้ตามความประสงค์ โดยไม่ต้องแจ้งเหตุผล ซึ่งการถอน
ตัวออกจากการวิจัยนั้น จะไม่มีผลกระทบในทางใดๆ ต่อข้าพเจ้าทั้งสิ้น

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติต่อข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการ
วิจัย และข้อมูลใดๆ ที่เกี่ยวข้องกับข้าพเจ้า ผู้วิจัยจะเก็บรักษาเป็นความลับ โดยจะนำเสนอข้อมูลการวิจัยเป็น
ภาพรวมเท่านั้น ไม่มีข้อมูลใดในการรายงานที่จะนำไปสู่การระบุตัวข้าพเจ้า

**หากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถ
ร้องเรียนได้ที่คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย
254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202**

E-mail: eccu@chula.ac.th

ข้าพเจ้าได้ลงลายมือชื่อไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารชี้แจงผู้เข้าร่วมการ
วิจัย และสำเนาหนังสือแสดงความยินยอมไว้แล้ว

ลงชื่อ...   ลงชื่อ...

(นางกุลิสรา กระลาม)   (...)

ผู้วิจัยหลัก   ผู้มีส่วนร่วมในการวิจัย

เลขที่โครงการวิจัย.........016-1/59

ลงชื่อ...

วันที่รับรอง.........1 1 พ.ค. 2559   (...)

วันหมดอายุ.........1 0 พ.ค. 2560   พยาน

V.2.4/2558

แบบสอบถาม

ความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล

ของผู้ปฏิบัติงานในอุตสาหกรรมเหล็กในประเทศไทย

Code: . . . .   Date: . . . . / 05 / 2559

คำชี้แจง

1.แบบสอบถามฉบับนี้มีจุดมุ่งหมาย เพื่อศึกษาความรู้ ทัศนคติและการปฏิบัติตนเกี่ยวกับการใช้
อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลของพนักงานและผู้รับเหมาที่ปฏิบัติงานเกี่ยวข้องกับงาน
อันตรายในอุตสาหกรรมเหล็ก

2. แบบสอบถามฉบับนี้ แบ่งออกเป็น 4 ส่วน คือ

    1) แบบสอบถามเกี่ยวกับข้อมูลทั่วไปของผู้ตอบแบบสอบถาม   จำนวน 13 ข้อ

    2) แบบสอบถามด้านความรู้เรื่องความปลอดภัยในการทำงานในอุตสาหกรรมเหล็ก

                                                      จำนวน 2 ข้อ

    ชนิดความสำคัญและการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล

                                              ข้อย่อย จำนวน 15 ข้อ

    3) แบบสอบถามด้านความเชื่อและทัศนคติในการใช้อุปกรณ์คุ้มครอง   จำนวน 1 ข้อ

    ความปลอดภัยส่วนบุคคลที่ปฏิบัติงานเกี่ยวข้องกับงานอันตรายในอุตสาหกรรมเหล็ก

                                              ข้อย่อย จำนวน 12 ข้อ

    4) ข้อมูลด้านการปฏิบัติตนในการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล

                                              จำนวน 2 ข้อ

                                              ข้อย่อย จำนวน 7 ข้อ

    รวมทั้งสิ้น จำนวน 18 ข้อ

3.แบบสอบถามฉบับนี้ใช้สำหรับการศึกษาวิจัยเท่านั้น การตอบแบบสัมภาษณ์นี้จะไม่มีผลกระทบ
ต่อท่านแต่อย่างใด แต่จะเป็นประโยชน์ในการสร้างความตระหนักและเสนอแนะแนวทางการป้องกัน
โรคและอุบัติเหตุจากการปฏิบัติงานในอุตสาหกรรมการผลิตเหล็ก

....

โปรดทำเครื่องหมาย ☑ ลงในช่อง หน้าข้อความที่ตรงกับคำตอบของท่าน หรือเติมข้อความ
ให้สมบูรณ์

ส่วนที่ 1.1: ข้อมูลทั่วไป

Q1. เพศ

    1. ☐ ชาย   2. ☐ หญิง

Q2. อายุ: . . . . (ปี)

Q3. ระดับการศึกษา

    1. ☐ ไม่ได้เรียน   2. ☐ จบประถมศึกษา (ป. - ป.6)

    3. ☐ จบมัธยมต้น/เทียบเท่า   4. ☐ จบมัธยมปลาย/ปวช./เทียบเท่า

    5. ☐ จบอนุปริญญา/ปวส.   6. ☐ จบปริญญาตรี/เทียบเท่า

    7. ☐ อื่นๆ (ระบุ)...........................

Q4. ท่านมีการตรวจสุขภาพเป็นระยะๆ หรือไม่

    1. ☐ ใช่   2. ☐ ไม่ใช่ **(ไปข้อ Q7.)**

Q5. ถ้าใช่ ระยะเวลาครั้งสุดท้ายที่ท่านตรวจสุขภาพ เมื่อใด

    1. ☐ < 3 เดือน   2. ☐ 3 - 6 เดือน

    3. ☐ 6 - 12 เดือน   4. ☐ ≥ 12 เดือน

Q6. ผลการตรวจสุขภาพของท่านเป็นอย่างไร

    1. ☐ ปกติ

    2. ☐ ผิดปกติ (โปรดระบุ)   ....

Q7. ท่านเคยเกิดอุบัติเหตุหรือเคยเป็นโรคจากการทำงานหรือไม่

    1. ☐ ใช่

    2. ☐ ไม่ใช่ **(ไปข้อ Q9.)**

Q8. ถ้าใช่ จำนวนครั้งของการเกิดอุบัติเหตุหรือโรคจากการทำงาน .... (ครั้งต่อปี)

ส่วนที่ 1.2: ลักษณะงานและประสบการณ์ในการทำงาน

Q9. ท่านทำงานในแผนก

    1. ☐ โรงหลอม   2. ☐ โรงรีด

Q10. ตำแหน่งงานของท่าน

    1. ☐ หัวหน้างาน   2. ☐ พนักงานปฏิบัติการ   3. ☐ ผู้รับเหมา

Q11. อายุการทำงานในตำแหน่งนี้ .... ปี

Q12. เวลาทำงาน เฉลี่ยต่อวัน .... ชั่วโมง

Q13. อันตรายในการทำงานปกติที่ท่านสัมผัส **(ตอบได้มากกว่า 1 ข้อ)**

    1. ☐อันตรายจากเครื่องจักร   2. ☐เสียงดัง   3. ☐ความร้อน

    4. ☐แสงจ้า   5. ☐ฝุ่น   6. ☐สารเคมี

    7. ☐ของเหลวกระเด็น   8. ☐ก๊าซคาร์บอนไดออกไซด์   9. ☐อื่นๆ ....

ส่วนที่ 2: ด้านความรู้เรื่องอันตรายจากกระบวนการผลิตเหล็ก ความสำคัญการใช้อุปกรณ์

    คุ้มครองความปลอดภัยส่วนบุคคล และชนิดของอุปกรณ์คุ้มครองความปลอดภัยส่วน

    บุคคล

Q14. กระบวนการผลิตเหล็กสามารถทำให้เกิดผลกระทบที่เป็นอันตรายต่อสุขภาพของท่าน

    1. ☐ ใช่   2. ☐ ไม่ใช่

Q15. ในความคิดของท่านสิ่งต่อไปนี้ข้อใดถูกต้อง   โปรดทำเครื่องหมาย ☑ ข้อที่ถูก หรือผิด

ข้อ	ข้อคำถาม	ถูก	ผิด
1	อันตรายจากกระบวนการผลิตเหล็ก เช่น อุบัติเหตุจากการทำงานกับเครื่องจักร ความร้อน แสงจ้า เสียงดัง สารเคมี เป็นต้น		
2	อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลพื้นฐาน เพื่อป้องกันอันตรายจาก กระบวนการผลิตเหล็ก คือ หมวกนิรภัย แว่นตา และรองเท้านิรภัย		
3	อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลคืออุปกรณ์ที่ช่วยลดความรุนแรง จากการสัมผัสอันตรายจากกระบวนการผลิตเหล็ก		
4	ผู้ที่ได้ยินเสียงดังมากติดต่อกันเป็นระยะเวลานานจะมีผลเป็นหูตึงและหูหนวกได้		
5	การไม่สวมใส่อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล ในการทำงาน ถือเป็นการกระทำที่ไม่ปลอดภัย		
6	การสวมใส่หมวกนิรภัยเมื่อทำงานกับเครื่องจักรเพื่อป้องกันจากการบาดเจ็บที่ศีรษะ		
7	ทำงานกับเสียงดังช่วงระยะเวลาสั้นๆ ไม่จำเป็นต้องใส่ ปลั๊กอุดหู และที่ครอบหู		
8	การทำงานในพื้นที่ไม่อันตราย ไม่จำเป็นต้องสวมใส่แว่นตานิรภัย		
9	พื้นที่การทำงานของท่าน สามารถสวมใส่ รองเท้าผ้าใบ หรือรองเท้าแตะได้		
10	การทำงานที่เกี่ยวข้องกับสารเคมีควรใส่ผ้าปิดปาก ปิดจมูกทุกครั้ง		
11	แว่นครอบตาสามารถป้องกันดวงตาได้มีประสิทธิภาพสูงกว่าแว่นตานิรภัยในการทำงาน กับสารเคมี ฝุ่น และงานเชื่อม		
12	ปลั๊กอุดหู และที่ครอบหู เป็นอุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลในการทำงานที่ เกี่ยวข้องกับเสียงดัง		
13	กระบังหน้านิรภัย งานความร้อน ใช้ป้องกันดวงตาและใบหน้าจากงานเจียร ขัด หรือ ป้องกันการกระเด็นของสารเคมี โลหะที่หลอม เหลวและรังสีความร้อนต่างๆ ได้		
14	เสื้อทนไฟป้องกันร่างกายจากการกระเด็นของโลหะร้อนและของเหลวร้อนอื่นๆ		
15	ปลอกแขนสวมใส่เพื่อป้องกันแขนจากความร้อน เช่นน้ำเหล็ก หรือ ของเหลวร้อน กระเด็นใส่		

ส่วนที่ 3: ทัศนคติและความเชื่อในการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล

Q16.โปรดทำเครื่องหมาย ☑ ตามความคิดเห็นของท่านกับข้อคำถาม ดังนี้

ข้อ	ข้อคำถาม	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
1	ท่านคิดว่า การสวมใส่อุปกรณ์ป้องกันอันตรายส่วนบุคคลตามที่บริษัทกำหนดจะสามารถลดอันตรายจากกระบวนการผลิตเหล็กได้					
2	ท่านคิดว่า อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลที่ใช้อยู่ไม่เพียงพอที่จะป้องกันตัวเองจากอันตราย					
3	ท่านคิดว่า อันตรายจากกระบวนการผลิตเหล็กมีเพียงความร้อนสูงและเสียงดังมาก					
4	ท่านคิดว่า อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลคืออุปกรณ์ที่ช่วยลดความเสี่ยงจากการสัมผัสอันตรายจากกระบวนการผลิตเหล็ก					
5	ท่านคิดว่า การใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลจะจำเป็นเมื่อมีหัวหน้างาน หรือผู้บริหารอยู่ในบริเวณด้วยเท่านั้น					
6	ท่านคิดว่า การใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลไม่มีประโยชน์และทำให้สูญเสียค่าจ่ายที่เพิ่มขึ้น					
7	ท่านคิดว่า การสวมใส่อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลในเวลาทำงาน ทำให้รำคาญ อึดอัด					
8	ท่านคิดว่า หากไม่มีอุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคลท่านจะยังไม่ทำงาน					
9	ท่านคิดว่า การทำงานจำเป็นต้องได้รับการอบรมเรื่องการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล					
10	ท่านคิดว่า ท่านใช้อุปกรณ์ป้องกันอันตรายส่วนบุคคลเหมาะสมกับประเภทงานที่ทำ					
11	ท่านคิดว่า ท่านใช้อุปกรณ์ป้องกันอันตรายส่วนบุคคลประเภทเครื่องป้องกันศีรษะทุกครั้งที่ปฏิบัติงาน					
12	ท่านคิดว่า ท่านใช้อุปกรณ์ป้องกันอันตรายส่วนบุคคลประเภทอุปกรณ์ป้องกันตาและใบหน้าทุกครั้งที่ปฏิบัติงานกับสารเคมี					

เลขที่โครงการวิจัย.......... 076.1/59
วันที่รับรอง.......... 1 1 พ.ค. 2559
วันหมดอายุ.......... 1 0 พ.ค. 2560

ส่วนที่ 4: การปฏิบัติตนในการใช้อุปกรณ์คุ้มครองความปลอดภัยส่วนบุคคล

Q17. ท่านเคยได้รับการอบรมหรือได้รับการแนะนำในการใช้อุปกรณ์ป้องกันภัยส่วนบุคคลในการ
ทำงานของท่าน

1. ☐ เคย   2. ☐ ไม่เคย

Q18. ขณะที่ท่านกำลังทำงานอยู่ในแผนกโรงหลอม และโรงรีด ท่านใช้อุปกรณ์คุ้มครองความ
ปลอดภัยส่วนบุคคลใด ๆ ที่แสดงในด้านล่าง

ข้อ	รายการ	ไม่เคย	บางเวลา	ตลอดเวลา
1	ป้องกันศีรษะ (หมวกนิรภัย)			
2	ป้องกันใบหน้าและดวงตา (กระบังหน้า)			
3	ป้องกันใบหน้าและดวงตา (แว่นครอบตา)			
4	ป้องกันใบหน้าและดวงตา (แว่นตานิรภัย)			
5	ป้องกันเสียงดัง (ปลั๊กอุดหู)			
6	ป้องกันเสียงดัง (ครอบหู)			
7	ป้องกันระบบทางเดินหายใจ (หน้ากากกรองสารเคมี)			
8	ป้องกันระบบทางเดินหายใจ (หน้ากากกรองฝุ่น)			
9	ป้องกันมือและแขน (ถุงมือ)			
10	ป้องกันมือและแขน (ปลอกแขน)			
11	ป้องกันลำตัว (ชุดปฏิบัติงาน)			
12	ป้องกันลำตัว (ชุดป้องกันสารเคมี)			
13	ป้องกันลำตัว (ชุดป้องกันความร้อน)			
14	ป้องกันลำตัว (เอี๊ยมกันความร้อน)			
15	ป้องกันลำตัว (ปลอกขา)			
16	ป้องกันลำตัว (เข็มขัดนิรภัย)			
17	ป้องกันเท้า (รองเท้านิรภัย)			
18	ป้องกันเท้า (รองเท้าบูท)			

ขอขอบท่านสำหรับการมีส่วนร่วมในการทำวิจัยในครั้งนี้

เลขที่โครงการวิจัย............ 016.1/59
วันที่รับรอง............ 11 พ.ค. 2559
วันหมดอายุ............ 10 พ.ค. 2560

APPENDIX B

Validity

1. Knowledge

No.	Score from qualified persons			Total $\sum R$	IOC = $\dfrac{\sum R}{N}$	Result
	1	2	3			
1	1	1	1	3	1	Pass
2	1	1	1	3	1	Pass
3	1	1	0	2	0.67	Pass
4	1	1	1	3	1	Pass
5	1	1	1	3	1	Pass
6	1	1	1	3	1	Pass
7	1	1	1	3	1	Pass
8	1	0	1	2	0.67	Pass
9	1	0	1	2	0.67	Pass
10	1	1	1	3	1	Pass
11	1	1	1	3	1	Pass
12	1	1	1	3	1	Pass
13	1	1	1	3	1	Pass
14	1	1	1	3	1	Pass
15	1	1	1	3	1	Pass

2. Attitude

No.	Score from qualified persons			Total ΣR	IOC = $\dfrac{\Sigma R}{N}$	Result
	1	2	3			
1	1	1	1	3	1	Pass
2	1	1	1	3	1	Pass
3	1	1	1	3	1	Pass
4	1	1	1	3	1	Pass
5	1	1	1	3	1	Pass
6	1	1	1	3	1	Pass
7	1	1	1	3	1	Pass
8	0	1	1	2	0.67	Pass
9	1	1	1	3	1	Pass
10	1	1	1	3	1	Pass
11	1	1	1	3	1	Pass
12	1	1	1	3	1	Pass

3. Practice

No.	Score from qualified persons			Total ΣR	$IOC = \dfrac{\Sigma R}{N}$	Result
	1	2	3			
1	1	1	1	3	1	Pass
2	1	1	1	3	1	Pass
3	1	0	1	2	0.67	Pass
4	1	0	1	2	0.67	Pass
5	0	1	1	2	0.67	Pass
6	0	1	1	2	0.67	Pass
7	1	1	1	3	1	Pass
8	1	1	1	3	1	Pass
9	1	1	1	3	1	Pass
10	1	1	1	3	1	Pass
11	1	1	1	3	1	Pass
12	1	1	1	3	1	Pass
13	1	1	1	3	1	Pass
14	1	1	1	3	1	Pass
15	1	1	1	3	1	Pass
16	1	0	1	2	0.67	Pass
17	1	0	1	2	0.67	Pass
18	1	1	1	3	1	Pass

Reliability Test for Questionnaire

Reliability Analysis - Scale (Alpha)

1. Knowledge

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
K1	10.67	6.989	.631	.685
K2	10.77	7.771	.169	.733
K3	10.70	6.700	.727	.672
K4	10.80	8.441	-.097	.762
K5	10.77	7.426	.313	.717
K6	10.63	7.482	.421	.707
K7	10.80	7.614	.220	.728
K8	10.63	7.482	.421	.707
K9	10.80	7.407	.304	.718
K10	10.87	8.326	-.060	.761
K11	10.80	7.269	.362	.711
K12	10.63	7.482	.421	.707
K13	10.67	6.989	.631	.685
K14	10.80	6.028	.940	.636
K15	10.67	8.437	-.084	.752

Reliability Coefficients

No. of Cases = 30   No. of Items = 15

Alpha = 0.729

2. Attitude

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	9.07	4.133	.642	.685
A2	8.90	5.128	.242	.737
A3	9.13	3.913	.700	.672
A4	9.07	4.961	.129	.754
A5	9.13	4.257	.486	.706
A6	8.97	4.792	.356	.725
A7	9.07	4.478	.417	.717
A8	8.90	5.128	.242	.737
A9	9.10	4.231	.534	.699
A10	9.13	5.292	-.064	.783
A11	9.10	4.231	.534	.699
A12	8.97	4.792	.356	.725

Reliability Coefficients

No. of Cases = 30   No. of Items = 12

Alpha = 0.740

3. Practice

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
P1	13.23	10.530	.481	.764
P2	13.27	11.168	.193	.783
P3	13.23	10.944	.307	.775
P4	13.43	11.151	.143	.790
P5	13.23	10.668	.422	.768
P6	13.23	11.702	.004	.794
P7	13.37	11.275	.117	.791
P8	13.30	10.286	.502	.761
P9	13.33	10.989	.224	.782
P10	13.30	10.562	.397	.769
P11	13.23	10.530	.481	.764
P12	13.30	10.424	.449	.765
P13	13.27	10.754	.352	.772
P14	13.40	9.421	.750	.738
P15	13.30	10.631	.371	.771
P16	13.20	10.510	.548	.761
P17	13.30	10.148	.556	.757
P18	13.20	11.131	.263	.778

Reliability Coefficients

No. of Cases = 30 No. of Items = 18

Alpha = 0.782

Testing Normality of data

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Knowledge Summary	.250	336	.000	.852	336	.000
Attitude Summary	.115	336	.000	.951	336	.000
Practice Summary	.132	336	.000	.927	336	.000

a. Lilliefors Significance Correction

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APPENDIX C

Number and percentages of hazards in steel industry that workers normally exposed to

Characteristics	Number (n= 336)	Percentage (%)
Hazards		
Accident from machine	270	80.4
Noise	336	100
Heat	331	98.5
Illuminate	177	52.7
Dust	336	100
Chemical	169	50.3
Splashes	208	61.9
CO	189	56.2

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APPENDIX D

Schedule Activities

Research Process	2015			2016						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Literature Review	→									
Writing Proposal	→									
Proposal Exam		→								
Revise Proposal		→								
Pretest and revise Questionnaire			→							
Ethical Consideration				→			→			
Data Collection								→	→	
Writing Report									→	
Summit for Final Exam										→
Thesis Defend										→
Revision										→
Summit Final Thesis										→

APPENDIX E

Budget

Order	Detail	Bath
1	Compensation for participants	5,000
2	Office tools	10,000
3	Research assistants employment	6,000
4	Experimental fees	5,000
5	Diagnosis from specialist fees	5,000
6	Transportation fees	5,000
Total		36,000
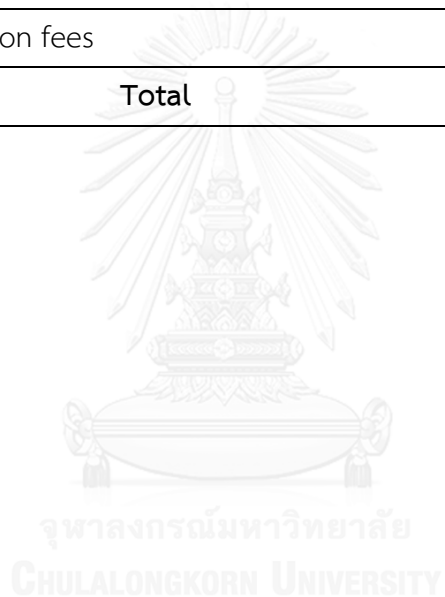
VITA

Missis Kulitsara Kralam was born on the 03 December, 1981, in Bangkok province, Thailand. She received a Bachelor of Science Degree in 2004 from Burapha University, Thailand and Master of Public and Administration Degree 2008 from Ramkhumkheang University, Thailand. After graduated, from April 2004 to October 2009, she worked as a safety officer of Company, Thailand. From November 2009 to July 2016, she worked as an occupational safety and health sr.consultant of NPC Safety and Environmental Service Co.,Ltd. She continued her study for a Master of Public Health in Environmental and Safety in College of Public Health Sciences, Chulalongkorn University in 2013 and completed the program in 2015.