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Safety Behavior at Work: A Case study of Operative Workers of Companies in Southern Industrial Estate, Songkhla Province, Thailand

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Abstract: This study aims to 1) examine the degree of work safety management of the Companies in Southern Industrial Estate, Songkhla Province, Thailand, 2) investigate the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province, Thailand, and 3) explore the factors affecting the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province, Thailand. The sample population was 400 operative workers of companies in Southern Industrial Estate, Songkhla Province. The instruments applied in the study were frequency, percentage, mean and standard deviation and the Multiple Regression Analysis. The findings indicated that 1) the work safety management of the Companies in Southern Industrial Estate, Songkhla Province is in the highest degree ($\bar{x} = 4.24$, $SD = 0.482$), 2) the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province is in the highest degree ($\bar{x} = 4.25$, $SD = 0.442$), 3) the factors affecting the safety behavior at work of operative workers are work safety management (Beta = 0.769), age (Beta = -0.143), work experience (Beta = 0.105) and marital status (Beta = -0.087). All of these factors are accounted for 66.9 per cent of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province.

Keywords: Safety behavior, operative workers, industrial estate.

1. INTRODUCTION

The industrialization which aims to keep up the pace of Thailand's advancement with the civilized countries has resulted in the deployment of machinery and rapid growth. This caused the majority of the workforce in the agricultural sector to shift to the industrial sector (Muangsorot, 2010). In response to the domestic industrial expansion, industrial factory entrepreneurs have utilized various forms of technology, machinery, raw materials and chemicals to enhance the manufacturing process. This rapid economic advancement from the industrial sector is come along with the increasing injuries and illnesses from the works of the

workers and posed the great challenge to the country development and consequently resulted in the social issues (Thamphan, 2011). Organizational accidents and injuries cause huge amount of employee's lives and property damages every year (Zhou and Jiang, 2015). It is estimated that two million people in worldwide die every year due to work-related diseases and work-related accidents (Kanten, 2013).

On August 26, 1997, the council of ministers of Thailand has reach the resolution to declared the 10th May of every year as "National Workplace Safety Day" in order to create the awareness among government and private sectors, employers, employees, associated parties and general public regarding the danger, loss and consequences of work injuries as well as to sustainably instill the common sense of the workplace safety to all workforce in every sectors. The National Workplace Safety Day has been declared following the Thailand's worst industrial factory tragedy; The Kader Toy Factory fire in Nakhon Pathom province on May 10, 1993. 188 people were killed, and over 500 were seriously injured. This event considered as an important lesson which required all associated parties to take preventive measures as well as improve the workplace safety management and spread the awareness to every party in order to promote the work safety as the common culture throughout the nation. At the present days, the statistic of work injuries is constantly decreasing from 2014 (October 2013-January 2014). The death toll caused by the work injuries is accounted for 2.2556: 100,000 people. In the year 2016 (October 2015-January 2016), the number has decreased to 1.9065. And from the worst case in 2014, the death toll rate of 1.2594: 1,000 people has been decreased to 0.9715 in 2016. If the injuries rate keeps decreasing, it will be the significant benefits to workers, entrepreneurs and the nation's overall economy (Thansettakij, 2016).

The workplace safety, occupational health, and the work environment are currently considered as essential factors in business operation. The danger in the workplace shall cause the damage to the business. The parties directly affected by this event are employers and employees. The employers have to spend the money when the accident occurred for medical treatment expenses, compensations as well as for the damaged materials and machinery. The employees will be harmed, injured, disabled, killed or sick by working. The indirect effects are a halt in production and delay which eliminate the business opportunities and the desirable returns. The current business philosophy is emphasized more on the human rights, social responsibility, corporate governance and including the righteous and ethical business management (Phujareun, 2005).

Promoting the safety behavior as the fundamental work behavior is, therefore, essential especially in the industrial sector which has the manufacturing process and factories as the basis. The priority should be placed on the health care and safety of every employee of the organization in order to gain confidence and boost the morale of the employees. Recently, the leading companies have to focus on the promotion of safety behavior at work as the fundamental behavior of the employees in the organization. This is the best approach to ensure the most effective workplace safety management (Thienraphakun, 2016). This is due to the fact that, in every year, the significant number of skilled human resources have been lost because of the work accident in addition to the requirement for the government to pay the abundant amount of compensations for injured workforces. Hence, the consideration of workplace safety and health of the employees is the essential issues that all parties should be aware and take into account. This is due to the fact that the effect of work environment or the consequence of occurred accidents is not only damaging the worker and the family but also directly affecting the organization.

The Southern Industrial Estate in Songkhla Province is the project established in accordance with the government policy to distribute the domestic industrialization to the regional level. The Ministry of Industry has assigned the Industrial Estate Authority of Thailand to establish the first industrial estate in the southern region at Songkhla province during General Prem Tinsulanonda's tenure as Thailand's Prime Minister in 1984. The project's objective was to gather numerous factories in the same area for the ease of management and prevent the environmental issues. This, however, is not mean that the companies operating in the industrial estate will be safe from other issues especially the workplace safety of the employees. The existence of the issue required the investigation of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province. This is because the Southern Industrial Estate in Songkhla Province is still confronting the issue of employee's workplace safety behavior. Furthermore, most of the work accidents occurred to the operative workers. This study, therefore, will provide the information and served as the guideline in improvement planning of the workflow as well as the identification of causes of accidents in workplace and taking into account of the benefits of promoting the safety behavior at work in addition to implement the study results in establishing the firm basis of workplace safety standard system that will eventually led to the formation of the standard and quality of good working life.

2. RESEARCH OBJECTIVES

1. To examine the degree of work safety management of the Companies in Southern Industrial Estate, Songkhla Province
2. To investigate the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province.
3. To explore the factors affecting the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province.

3. SCOPE OF RESEARCH

3.1. Area Scope

The research area is Southern Industrial Estate, Songkhla Province.

3.2. Time Scope

The data were collected from April 1-30, 2017.

4. POPULATION AND SAMPLE SCOPE

The population of this study was the operative workers of companies in Southern Industrial Estate, Songkhla Province which consists of 20 operating companies (Southern Industrial Estate, Songkhla Province, 2017). The sample size determination of this study, since the associated departments have not categorized the information of workers of companies in Southern Industrial Estate, Songkhla Province, the actual number of workers of companies in Southern Industrial Estate, Songkhla Province is unknown. Furthermore, there is no information regarding the proportion of workers in Southern Industrial Estate, Songkhla Province. Hence, the author has determined the sample size at the 95% confidence level and 5% deviation using

Cochran's sample size formula (Cochran, 1977). In order to reduce the mistakes of misinformation or refusal of the questionnaire, the author has determined the sample size at 400. However, as the size of the industry might affect the safety management, the author hence categorized the workplaces in Southern Industrial Estate, Songkhla Province according to the business nature and size. The industrial categories of the workplaces in Southern Industrial Estate, Songkhla Province has been divided into the large and small scale industry. The simple random sampling method then was used to select at least five companies from each industrial category and the sample units were equally selected from each company, which is 40 workers from each company using the method of convenience sampling.

5. LITERATURE REVIEW

Occupational safety aims to prevent the accidents caused by the unsafe behavior of the employees and/or the unsafe work environment, and to create a safe working environment. While the goal of employee health is to protect employees against risks and health hazards inherent in their jobs (Sadullah, 2009). The safety behavior at work refers to the action or the expression of the employees in such states that are free from accident, injury, disability, death, occupational illness, damaged properties and good health and sanitation. According to the behavioral science, the safety behavior shall occur under several accompanying factors. These factors can be separated into three categories (Muangphra, 2006):

1. The factors that influence the individual to act with safety behavior (predisposing factors). These factors are associated with the knowledge, understanding, belief, attitudes and the preference of the individual toward certain matter related to the sanitary behavior. These behaviors caused by the learning or experience acquired from learning of the individual, mostly directly or indirectly or by self-learning.
2. The factors encouraging the safety behavior (enabling factors). These factors caused by the opportunities of individuals in accessing the existing and available service or equipment thoroughly *e.g.* the clinic, food sources or safety equipment, among others.
3. The factors reinforcing the safety behavior (reinforcing factors). These are the factors in addition to the aforementioned factors *i.e.* factors derived from the individual action directly and indirectly associated with the work such as family, relative, friend, employer and other personnel. These individuals are affecting the instillation or the transformation of sanitary behavior by cultivation, encouragement, persuasion, role model, supervision as well as promoting the appropriate actions or practices which will eventually lead to the desired health condition or sanitary behavior.

Wattanaphan (2006) stated that the safe work behavior refers to the action or the expression of the employees in such states that are free from accident or risk of the accident which consisted of the three following elements:

1. The behaviors associated with rules and regulations. This refers to the nature of learning how to work according to the work safety manual and strictly complied with the safety signs as well as the appropriate wearing of personal safety equipment such as shoes, helmet, ear muff, ear plug, and gloves during work.
2. The behaviors associated with accessories, equipment and machinery application. This refers to the strict compliance with the use instructions of the machinery, suspending the machinery

during the maintenance or cleaning, halting the use of accessories, equipment, and machinery upon the discovery of abnormality and promptly notify the person in charge and the colleagues. The inspection of accessories and equipment before and after the application of the safety accessories such as the safety belt life line in addition to the clearing, arranging and cleaning of the machinery, office and the factory premise.

3. The behaviors associated with physical and mental readiness. This refers to the work behaviors of cautiously and appropriately dressing such as wearing safety shoes and the respirator when operating with the machine and refrain from work once realized that the physical readiness is absent such as from feeling sick, drowsy from taking certain drugs, intoxicated, exhausted. The individual should fasten the safety belt during driving or be a passenger in a car and even more careful when driving a car or riding a motorbike.

Simachokdee and Chaleumjirarat (2006) stated that the effective safety promotion in the industrial factories required the principle of 3E;

1. Engineering refers to the implementation of technical or engineer knowledge in calculating and designing the accessories and equipment for the highest safety, the installation of protective equipment for the moving or exposing parts of the machine as well as the planning of the factory, electricity, lighting, sound, air ventilation etc.
2. Education refers to educating and training and mentoring the workers, supervisors and the associated personnel with the knowledge and understanding of how to prevent the accident and reinforce the safety in the factory. They should understand the causes of accidents and how to prevent them and know which are the safest ways to work etc.
3. Enforcement refers to the regulation of safe working and the required rules and measures for the workers to comply as the common code of conduct. The violation or disobedience of code of conduct shall result in the punishment accordingly in order to instill the common sense and avoiding the inappropriate or dangerous work.

It can be concluded from the aforementioned facts that the safety at work is the cooperation among every employee to eliminate the unsafe acts and unsafe conditions from the workplace.

5.1. Factors Associated with the Safety Management

Safety and healthy workplace has received many researches attention in the recent years. Safety behaviors are one of the major issues of organizations (Harsini and Ghofranipour, 2016). The approach to the most effective and highest safety management is associated with the following factors (Thiamsawet, 2006):

1. *Age:* The comparison of personnel's hospital admission and the age and work experience from the statistical analysis of the accident occurrence record revealed that the personnel with ages between 18-23 years tend to be more injured as they grew older and the personnel with ages between 23-26 years have the highest rate of hospital admission at 1.25 times a year. The personnel with ages of 25 years and over tend to be less injured as they grew older. The elder workforces with ages of 50 years and over are the personnel with the great extent of precaution and work experience. They are aware of highly dangerous work condition with prudence and carefulness as well as being more accurate on situation analysis and assessment.

2. *Education*: By providing the appropriate education or training, it will enable fast and explicit achievement since if the individual has knowledge and understanding of the responsible work as well as of how to work safely, the chance of accident occurred from the unsafe acts will be eliminated. This will consequently lessen down the damage as the accident can be solved and prevented.
3. *Work experience*: The employee is one of the major factors of the accident. This means that the amateur and veteran employees have different work experience and different cause of accidents.

5.2. Guidelines for Safety

Safety behavior can be seen as closed and open actions that are adopted by the individual to prevent feared outcomes and maintain a sense of safety (Lümker, 2012). According to Na Chiang Mai (2004), as the workers are the essential element in reducing the work accident, if they are regularly performing their tasks with carefulness and caution, their work place will be safer. In other words, the employees are the key to the factory safety. These are the practices that the employees should implement during the performance:

1. Applying the available equipment with caution.
2. Notify the certain conditions that might be harmful and dangerous to the safety committee or associated personnel.
3. Recommend the safer and better work procedures compared to the current ones.
4. Provide assistance, advice, and warning to the newcomers regarding the work safety.

5.3. The Firenze System Model

Firenze (1959, cited in Thupateme, 2005) defined the concept of safety system as the requirement to examine the entire elements which are interrelated. Such elements consist of the man, machine, and environment. Each element has the potential to be the cause of the accident and essential to the decision of performance and the occurrence of the accidents as discussed below:

1. *Man (or worker)*: In performing each task or producing a piece, one required to make the decision or the certain approach to achieve the goal. The decision to proceed and accomplish the goal, however, always come with the latent risk. Hence, the worker is required to gain sufficient information. The accurate information will result in the accurate decision. The inaccurate information, however, will result in the in the accurate decision and great amount of risk. It can eventually cause the failure in performance and the accident. The safety practice is an essential task for the personnel and required sufficient training with the support from executives and investigation for evident causes of each accident.
2. *Machine*: The machine used for production should be in perfect condition and flawless. The inaccurate design of the machine according to the principle or lack of good maintenance will result in the error of performance and eventually lead to the accident.
3. *Environment*: The work condition and environment play the significant role in the manufacturing process. The error in the environment will bring about problems in the man and the machine which will result in the accident *e.g.* working under the diffusing toxins or dazzle.

Therefore, prior to every decision, the worker has to acquire information to ensure the accurate decision by considering all information regarding the tasks and nature of harmful consequences. The more sufficient and higher quality the information acquired, the less risk will likely to occurred and will be limited to the manageable extent. The aforementioned reasons, therefore, required the workers to be provided with the greatest amount of useful information. For example, by providing the training or coaching to ensure that the workers acquired useful work information. This will allow the effective performance as well as reduce the error caused by the worker's decision.

5.4. Accident Related Theories

Accident refers to incidental, and unplanned event which is uncontrollable and often damages the property, body, organization or resulted in the injury or death (Phosrikam, 2006). The accident related theories have been applied to establish the hypothesis of the accident caused by performance. The human errors are the essential issue which requires correction and effective preventive measure. Several accident related theories can be applied as follows (Chaleumjirarat, and Simachokdee, 2005).

5.4.1. The Domino Theory

Heinrich, who developed the Domino Theory stated that all incidents are directly related to unsafe conditions and acts. Accidents result from a chain of sequential events, metaphorically like a line of five dominoes falling over. When one of the dominoes falls, it triggers the next one, and the next...Heinrich' five metaphorical dominoes are Social Environment and Ancestry, Fault of Person, Unsafe Act or Mechanical or Physical Hazard (unsafe condition), Accident, and Injury. The social environment and ancestry of certain individual will cause the unsafe act or condition and resulted in injury and damage. The elements of each of these five dominoes can be explained as follows (Phosrikam, 2006);

The 1st domino, the ancestry of the personnel. This is the inheritance from the ancestors and the social environment. The elements which contribute to the accident are undesirable personality traits such as stubbornness, greed, and recklessness including other personalities passed along through inheritance, learning and shaped by the social environment.

The 2nd domino, the fault of the personnel. It refers to inborn or obtained character flaws genetically inherited and shaped by the social environment such as bad temper, inconsiderateness, ignorance, and recklessness etc. which contribute to the unsafe acts or the existence of unsafe conditions of machine and performance.

The 3rd domino, unsafe act and unsafe condition. It deals with the unsafe act and unsafe condition. For example, standing under suspended loads, starting machinery without warning, horseplay, or removal of safeguards, among others. An unsafe condition or mechanical hazards refer to the unguarded gears, unguarded points of operation, the absence of rail guards and insufficient light. These factors are causes of the accident.

The 4th domino, accident. It refers to the incidental, and unplanned event as a result of the 3rd domino. Accidents are events such as falls of persons, striking of persons by flying objects are typical accidents that cause injury.

The 5th domino, injury, and loss. It results from the 4th domino. Some types of injuries to the body are cuts and broken bones, among others. These injuries are the direct results of accidents.

5.4.2. Accident Causation Model Theory

The Accident Causation Model Theory has been developed for the safety management in the United States of America's army in response to the implementation of new technology to defend the country. The U.S. Army has studied the safety technology as well as the manufacturing technology and applied this proposal as the accident causation model. Three primary causes of accidents can be concluded as follows (Watthanaphan, 2006):

1. Human Error, caused by the unsafe acts of workers or unsafe performance. Such errors might occur from the physical defects, insufficient training, and work encouragement or motivation.
2. System error may cause by the inappropriate design due to the inappropriate policy of the department such as by reducing the cost, technology implementation, maintenance or due to the failure caused by inaccurate design according to the principles etc.
3. Management system error may cause the failure in management, inaccurate information, inappropriate implementation of technology and work system. These failures may cause by the misinformation, insufficient training and the shortage of work encouragement.

5.4.3. Contributing Factors in Accident Causation (CFAC) Model

Contributing Factors in Accident Causation (CFAC) Model has been developed by gathering the information from various accident causation models by the researchers and integrated them together. The uniqueness of this model is the focusing on management factors and the social psychological factors which have been categorized in the groups of personnel, machine and environmental factors (Phosrikam, 2006).

This model suggested that the accidents caused by unsafe behaviors of individuals are the results of various personal factors including the ability, enthusiasm, experience, training, personality, physical performance, age, fatigue, motivation, liquor/narcotic intoxication, sickness, intelligence quotient, work pressure and the job satisfaction. These personal factors, however, influenced by several external factors as follows;

1. Physical environment factors *i.e.* sound, light, temperature, working space, architecture and pollutions in the workplace.
2. Equipment design factors *i.e.* the control buttons of the equipment, the visually lucid design of the equipment, warning alarms, workplace preparedness and the bright light filter for VDT workstations.
3. Task factors *i.e.* the urgent task, work overload, over focus on work, the task that required regular movement, episodic task, work procedure, shifts and the break schedule.
4. Environmental and social psychological factors *i.e.* group norms, organizational atmosphere, the trade union, and inter-group communication.

By taking thorough consideration, however, revealed that every aforementioned factor is influenced by the organizational management. The associated particular organizational management including organizational management policy, safety policy, production pressure, management style, centralized decision making, working group assignment, procurement and recruitment process, employee improvement, coordination and organizational structure.

5.5. Causes of Accidents

Accidents occur from the following causes (Yusuk, 2005):

5.5.1. Common or incentive causes of accidents.

1. Inefficient workplace safety orientation and safety coaching. Ineffective safety rules. The safety issue has not been integrated as part of the work. Not regularly monitor the safety behavior of worker. Dangerous issues have not been solved. Safety equipment is not sufficiently available for the workers.
2. Individual mental status. Shortage of knowledge or awareness of safety. Insufficient coordination. Inappropriate attitude toward the individual or the task nature. Slow mental response. The absence of work determination. The inability of emotional control *e.g.* excitable, nervous, and squeamish.
3. Individual physical status. Fatigue, deafness, visual impairment, not physically ready for the task.

5.5.2. Direct causes of accidents

1. Unsafe acts *e.g.* refuse to use the provided safety equipment or removal. Inappropriately lift the materials with potential harm to the body such as by inaccurately use of equipment for work despite provided with appropriate equipment. Risky movements such as walking, running, jumping, stepping, climbing or horse playing.
2. Unsafe conditions *e.g.* poor quality of safety equipment, absent of safety equipment despite the demands. Inefficient maintenance and risky storage.

5.6. Safety Management Procedure in the Factory

Safety management at work refers to the organization's regulation of safety guidelines to educate its employee and enable the safe work. The safety management can be categorized into four following aspects (Kaeochaitheam, 2005):

1. *Organizational management:* This refers to the configuration of the structure and the personnel's responsibility to implement the safe practice by making the safety manual, establishing the safety committee, safety policy making, rules, regulations and principles regarding the work safety, the display of work accident record and the handling procedure for the potential emergency situation.
2. *Work environment arrangement:* This refers to enable the safety in the workplace by organizing the working space, workplace cleaning, heat, light, noise, passageway, emergency exit and workplace inspection.
3. *Work accident prevention:* This refers to the preventive actions against the accidents regarding the assignment of associated personnel to supervise the task, providing the personal safety equipment, warning sign installation for the application of equipment, machine inspection and maintenance, safety training and identifying the causes of accidents in order to prevent them.
4. *Chemical management:* This refers to providing the safety precaution in the chemical application for the worker, information collection for all chemicals available in the factory, storage regulation, chemical storage facility and providing the equipment for emergency events.

6. RESEARCH HYPOTHESIS

1. The work safety management of the Companies in Southern Industrial Estate, Songkhla Province is in the high degree.
2. The safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province is in the high degree.
3. The personal factors, work factors, and safety management posed the impact toward the operative workers of companies in Southern Industrial Estate, Songkhla Province.

7. RESEARCH CONCEPTUAL FRAMEWORK

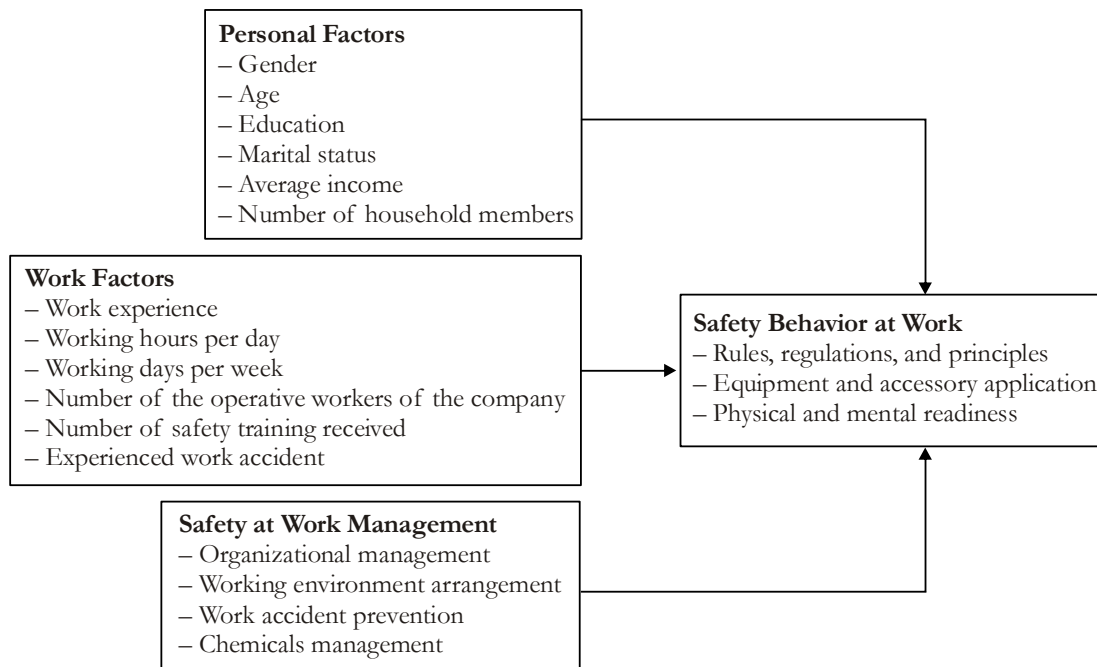


Figure 1: Research Conceptual Framework

8. RESEARCH METHODS

8.1. Sources of Data

1. Documentary research obtained by studying the documents, books, and other texts about theories, concepts, and related research as the guidelines of this study.
2. A field study has been conducted to collect data using questionnaires filled in by operative workers of companies in Southern Industrial Estate, Songkhla Province.

8.2. Population and Sample

The population of this study was the operative workers of companies in Southern Industrial Estate, Songkhla Province which consists of 20 operating companies (Southern Industrial Estate, Songkhla Province, 2017).

The sample size determination of this study, since the associated departments have not categorized the information of workers of companies in Southern Industrial Estate, Songkhla Province, the actual number of workers of companies in Southern Industrial Estate, Songkhla Province is unknown. Furthermore, there is no information regarding the proportion of workers in Southern Industrial Estate, Songkhla Province. Hence, the author has determined the sample size at the 95% confidence level and 5% deviation using Cochran's sample size formula (Cochran, 1977) which resulted in the sample size of 385. In order to reduce the mistakes of misinformation or refusal of the questionnaire, the author has determined the sample size at 400. However, as the size of the industry might affect the safety management, the author hence categorized the workplaces in Southern Industrial Estate, Songkhla Province according to the business nature and size. The industrial categories of the workplaces in Southern Industrial Estate, Songkhla Province has been divided into three categories: the large scale, the small scale, and the domestic industry (Thai Industrial Factory, 2011).

According to the Table 1, the industrial categories of the workplaces in Southern Industrial Estate, Songkhla Province has been divided into the large and small scale industry. The simple random sampling method then was used to select at least five companies from each industrial category and the sample units were equally selected from each company, which is 40 workers from each company using the method of convenience sampling as shown in Table 1.

Table 1
The Number of Workplaces in Each Industrial Category and Sampling

<i>Industrial category</i>	<i>Number of workplaces</i>	<i>Number of sample workplaces</i>	<i>Number of samples from each workplaces</i>	<i>Total sample number</i>
Large scale industry	7	5	40	200
Small scale industry	13	5	40	200

8.3. The Tool Used for Data Collection

For this research, the questionnaires were used to collect data. The questionnaire was divided into four sections.

Section 1

General information of the informant including gender, age educational state, marital status, income and number of the household members.

Section 2

The work factors including work experience, working hours, working days/weeks, the amount of the company's operative workers, safety training experience, and work accident experience.

Section 3

Safety at work management including organizational management, working environment arrangement, work accident prevention, and chemicals management.

Section 4

Safety behavior at work including safety rules, regulations and principles at work, safety equipment and accessory application, and physical and mental readiness of the employees.

The nature of the answers involves both writing and multiple choices.

8.4. Data Analysis

This study is a quantitative research which applied the questionnaires in collecting data. The collected research data were then analyzed using the computer software package. The statistics used for data analysis were:

1. Descriptive statistics: frequency, percentage, mean and standard deviation.
2. Inferential statistic: multiple regression analysis.

9. RESEARCH FINDINGS

9.1. Personal Factors of the Sample

The study of 400 sample of operative workers of companies in Southern Industrial Estate, Songkhla Province indicated that the majority of the sample is male over the female at — per cent. The studied years were 33.08 respectively. The sample has the average ages between 39.5 and 60.5. The average income is 13,007.36 THB. The married workers accounted for 12.67 per cent.

9.2. Work factors of the Operative Workers

By examining the work factors of the operative workers, it has been discovered that the sample has average work experience of 6 years. The majority of operative workers averagely work for 8 hours a day, accounted for 98.30 per cent, and averagely work for 6 days a week accounted for 83.90 per cent. The organization which the workers are employed averagely consist of 123 operative workers. The sample has been trained about safety for averagely 3.68 times and 68.30 per cent of the worker has no work accident experience.

9.3. Safety at Work Management

The examination of safety at work management for this study consisted of 4 aspects including organizational management, working environment arrangement, work accident prevention, and chemicals management. The results of safety management degree analysis for each aspect are as followed;

9.3.1. Organizational management

The safety at work management regarding the overall organizational management is in the highest degree ($\bar{x} = 4.21, SD = 0.566$). The analysis in each aspect revealed that the three issues have the highest degree in the average order: 1) the written safety at work policy, 2) the notice of safety at work policy for the employees and, 3) the supervisors have strictly complied with the safety regulations.

9.3.2. Working environment arrangement

The safety at work management regarding the overall working environment arrangement is in the highest degree ($\bar{x} = 4.24, SD = 0.537$). The analysis in each aspect revealed that every issue is in the highest degree except for the issue of fire alarm system management and regular inspection and organized equipment arrangement. The sample has the high degree of opinions for these two issues.

9.3.3. Work accident prevention

The safety at work management regarding the overall work accident prevention is in the high degree ($\bar{x} = 4.18, SD = 0.563$). The analysis in each aspect revealed that every issue is in the high degree except for the issues of sufficient personal safety equipment with the efficient condition for usage and the posting of a warning sign to wear the personal safety equipment which gained the highest degree of opinions.

9.3.4. Chemicals management

The safety at work management regarding the overall chemicals management is in the high degree ($\bar{x} = 4.18, SD = 0.607$) The analysis in each aspect revealed that every issue is in the high degree except for the issue of the visible labels provided for every chemical in the factory. The sample has the highest degree of opinions for this issue.

9.3.5. The overview of safety at work management

The overall safety at work management of the companies in Southern Industrial Estate, Songkhla Province is in the highest degree ($\bar{x} = 4.24, SD = 0.482$). Two aspects are in the highest degree: the working environment arrangement and organizational management. Meanwhile, the work accident prevention and chemicals management are in the highest degree as shown in table 2.

Table 2
Safety at Work Management

<i>Elements</i>	\bar{x}	<i>SD</i>	<i>Degree</i>
1. Organizational management	4.21	0.566	Highest
2. Working environment arrangement	4.24	0.537	Highest
3. Work accident prevention	4.18	0.563	High
4. Chemicals management	4.18	0.607	Highest
Overview	4.24	0.482	Highest

9.4. Safety Behavior at Work

The study of safety behavior at work for this study has been divided into three aspects including rules, regulations and principles, equipment and accessory application, and physical and mental readiness. The detailed results of the analysis of safety behavior at work are as follows:

9.4.1 Rules, regulations, and principles

The safety behavior at work regarding the overall rules, regulations, and principles is in the highest degree ($\bar{x} = 4.25$, $SD = 0.461$). The analysis in each aspect revealed that the issue with the highest average degree is the compliance with safety rules, regulations, and principles. The issue with the lowest average degree is the reading and understanding of the MSDS (Material Safety Data Sheet) when dealing with the dangerous chemical.

9.4.2. Equipment and accessory application

The safety behavior at work regarding the overall equipment and accessory application is in the highest degree ($\bar{x} = 4.22$, $SD = 0.518$). The analysis in each aspect revealed that the issue with the highest average degree is the strict compliance with safety instructions of the machine. The issue with the lowest average degree is the clearing, arranging and cleaning of the machinery, and the factory premise.

9.4.3. Physical and mental readiness

The safety behavior at work regarding the overall physical and mental readiness is in the highest degree ($\bar{x} = 4.23$, $SD = 0.531$). The analysis in each aspect revealed that every issue is in the highest degree except for the issue of refraining from concerning thoughts during work which is in the high degree. The issue with the highest average is the consideration of working safely before work.

9.4.4. The overview of safety behavior at work

The overall safety behavior at work is in the highest degree ($\bar{x} = 4.25$, $SD = 0.442$). Three aspects of safety behavior at work are in the highest degree: rules, regulations, and principles, physical and mental readiness to work, and the equipment and accessory application respectively in the descending order of the average as shown in table 3.

Table 3
Safety Behavior at Work (SBW)

<i>Elements</i>	\bar{x}	<i>SD</i>	<i>Degree</i>
1. Rules, regulations, and principles	4.25	0.461	Highest
2. Equipment and accessory application	4.22	0.518	Highest
3. Physical and mental readiness	4.23	0.531	Highest
Overview	4.25	0.442	Highest

9.5 Hypothesis Test

The author has determined three hypothesis for this study as follows:

Hypothesis 1

The work safety management of the companies in Southern Industrial Estate, Songkhla Province is in the high degree.

The findings of hypothesis test as shown in Table 4 revealed that Sig.(2-tailed) is equal to 0.231 which resulted in the 1-tailed Sig. of 0.116. This means that Sig. is higher than the significance of 0.05 level. It can be concluded that the degree of safety management is greater-than or equals to 4.21. This indicated that the degree of work safety management of companies in Southern Industrial Estate, Songkhla Province is highest with the significance of 0.05 level.

Table 4
Results of Hypothesis Test for Degree of Work Safety Management

<i>Test Value = 4.21</i>						
					<i>95% Confidence Interval of the Difference</i>	
	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>Lower</i>	<i>Upper</i>
Degree of work safety management	1.200	366	.231	.03021	-.0193	.0797

Hypothesis 2

The safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province is in the high degree.

The findings of hypothesis test as shown in Table 5 revealed that Sig.(2-tailed) is equal to 0.099 which resulted in the 1-tailed Sig. of 0.0495. This means that Sig. is lower than the significance of 0.05 level. However, as *t* is greater than 0 (*t* = 1.655), it means that the degree of safety behavior at work of the employee is greater-than or equals to 4.21. This indicated that the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province is highest with the significance of 0.05 level.

Table 5
Results of Hypothesis Test for Degree of Safety Behavior at Work

<i>Test Value = 4.21</i>						
					<i>95% Confidence Interval of the Difference</i>	
	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>Lower</i>	<i>Upper</i>
Degree of safetybehavior at work	1.655	390	.099	.03699	-.0070	.0809

Hypothesis 3

The personal factors, work factors, and safety management posed the impact toward the operative workers of companies in Southern Industrial Estate, Songkhla Province.

The review of literature and safety behavior at work research has formed the model of essential elements affecting the safety behavior at work as follows:

$$SBW = f(\text{Sex, Age, Education, Status, Income, Family, Experience, Hour, Day, Employee, Training, Accident, SMW})$$

The regression analysis has been applied to the above model and resulted in the following equation:

$$SBW = \alpha + \beta_1 (\text{Sex}) + \beta_2 (\text{Age}) + \beta_3 (\text{Education}) + \beta_4 (\text{Status}) + \beta_5 (\text{Income}) + \beta_6 (\text{Family}) + \beta_7 (\text{Experience}) + \beta_8 (\text{Hour}) + \beta_9 (\text{Day}) + \beta_{10} (\text{Employee}) + \beta_{11} (\text{Training}) + \beta_{12} (\text{Accident}) + \beta_{13} (\text{SMW}) + ei$$

Where as SBW	is the average safety behavior at work
Sex	is Gender
Age	is age (years)
Education	is the educational stage (years of education)
Status	is the marital status
Income	is the average income (in THB)
Family	is the number of household members
Experience	is the work experience (years)
Hour	is the working hours per day
Day	is the working days per week
Employee	is the number of the operative workers of the company (persons)
Training	is the number of safety training received (times)
Accident	is the experienced work accident (times)
SMW	is the average safety management at work

In the study of factors affecting the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province, the author has analyzed the relationship between factors affecting the safety behavior at work of operative workers. The result indicated that the relationship value between all pairs of independence factors have lower than 0.80 relationship value which has not caused the issue of multicollinearity to the multiple regression analysis. The details are shown in Table 6.

The table 7 revealed that Sig. (0.000) is lower than the significance (0.05). It thus can be concluded that there is at least one factor affecting the safety behavior at work.

The analysis of multiple regression equation in Table 8 indicated the four independent factors affecting the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province which is statistically significant at 0.05 level which are age (Sig. = 0.003), marital status (Sig. = 0.029), work experience (Sig. = 0.032) and safety at work management (Sig. = 0.000).

These findings can be formed as the multiple regression equations of factors affecting the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla Province as the raw score as follows:

$$SBW = 2.023 - 0.009(\text{Age}) - 0.079 (\text{Status}) + 0.011 (\text{Experience}) + 0.638 (\text{SMW})$$

Table 6
Safety Behavior at Work

	<i>SMW</i>	<i>Education</i>	<i>Day</i>	<i>Hour</i>	<i>Accident</i>	<i>Status</i>	<i>Family</i>	<i>Sex</i>	<i>Income</i>	<i>Age</i>	<i>Training</i>	<i>Employee</i>	<i>Experience</i>
SMW	1.000	.076	.011	.047	-.030	.086	-.008	.064	.007	.095	-.087	.137	.012
Education		1.000	-.035	-.066	-.030	.049	.077	-.236	-.146	.298	-.111	.442	-.268
Day			1.000	-.117	-.070	-.089	.098	.115	.081	.134	.236	.011	-.106
Hour				1.000	.042	-.078	-.157	.053	.117	-.158	-.193	.031	.369
Accident					1.000	.008	.010	.154	-.024	-.118	.054	-.051	.065
Status						1.000	.017	-.019	-.116	-.263	-.100	-.111	-.091
Family							1.000	.030	-.042	-.051	.216	.137	.016
Sex								1.000	.060	-.088	.120	-.268	.067
Income									1.000	-.055	.043	.199	.043
Age										1.000	.072	.249	-.497
Training											1.000	.081	-.319
Employee												1.000	-.131
Experience													1.000

Table 7
One-Way ANOVA

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Regression	37.719	13	2.901	40.649	.000
Residual	18.701	262	.071		
Total	56.420	275			

And as the standard score as follows:

$$Z_{SBW} = -0.143(\text{Age}) - 0.087(\text{Status}) + 0.105 (\text{Experience}) + 0.769 (\text{SMW})$$

The analysis of standard regression coefficient indicated that the factors which have the highest effect on the degree of safety behavior at work of the workers are the safety at work management (Beta = 0.769), age (Beta = -0.143), work experience (Beta = 0.105), and marital status (Beta = -0.087), respectively. The factors which increase the degree of safety behavior at work of the workers as they are increasing are the safety at work management and work experience. Whereas the age has the reverse effect. The marital status revealed that the worker with single or other marital status has the higher degree of safety behavior at work that the married worker.

The safety at work management, age, work experience and marital status are accounted for 66.9 ($R^2 = 0.669$, Adjusted $R^2 = 0.652$) per cent of the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla. The details are shown in Table 9.

It can be concluded from the information analysis that in the 3rd hypothesis, the personal factors (age and marital status), work factors (work experience), and the safety at work management are affecting the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla.

Table 8
Regression Equation Coefficient

	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>		
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>
(Constant)	2.023	.744		2.720	.007*
Sex	-.011	.036	-.012	-.300	.764
Age	-.009	.003	-.143	-3.048	.003*
Education	-.004	.005	-.036	-.825	.410
Status	-.079	.036	-.087	-2.198	.029*
Income	1.697E-006	.000	.023	.592	.555
Family	.018	.012	.057	1.506	.133
Experience	.011	.005	.105	2.152	.032*
Hour	-.049	.087	-.022	-.562	.575
Day	.015	.049	.011	.304	.761
Employee	-4.906E-006	.000	-.002	-.054	.957
Training	.007	.005	.057	1.351	.178
Accident	.003	.017	.008	.209	.835
SMW	.638	.031	.769	20.861	.000*

* Significant at the 0.05 level.

Table 9
Model Summary

<i>Predictor Variable</i>	<i>R</i>	<i>R²</i>	<i>Adjusted R²</i>	<i>Std. Error of the Estimate</i>
Safety behavior	.818	.669	.652	0.267

10. RESEARCH DISCUSSION

1. Age is opposing to the safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla. This result is in contrast with the findings of Srithongsatien (2005) and Phosrikam (2006) which stated that the employees with higher ages have better safety behavior at work than the lower ages employees. This might be due to the fact that the nature of works performing by the different employee is difference. Some types of work are supporting the more carefulness of performance for the employees with higher ages. On the other hand, some types of work are inciting higher risk for the employees with higher ages.
2. The marital status contributes to the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla. This result is in accordance with the findings of Srithongsatien (2005), Watthanaphan (2006) and Phosrikam (2006) which indicated that the single worker has better safety behavior than the married worker. This might be due to the fact that the single worker will be more focused and concentrated on the work while the married worker might distracting with the issues of family life.

3. Work experience contributes to the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla. This result is in accordance with the findings of Srithongsatien (2005), Watthanaphan (2006) and Phosrikam (2006), Kemthong (2006), Phummaphan (2007), Sasom (2008), Kamonrat (2009), Saentree (2013) and Sriwarom (2014) which indicated that the worker with more experience has the better safety behavior than the worker with less experience as the more experience will enable the employee to has safer behavior at work.
4. The safety at work management contributes to the degree of safety behavior at work of operative workers of companies in Southern Industrial Estate, Songkhla. This result is in accordance with the findings Kaeochaitheam (2005), Kansit (2007), Phummaphan (2007) and Sasom (2008). In the addition, Srithongsatien (2005) discovered that the employee with no work accident experience, the employee who received safety training and the employee who received personal safety equipment training will have the better safety behavior at work. Phosrikam (2006) suggested that the employee with the high awareness of risks at work has the high degree of safety behavior at work.

11. RECOMMENDATIONS

11.1. This Study's Recommendations

1. The training should be provided to the employee to enable the knowledge and understanding despite the employee is the elder. This is due to the fact that the work procedure, technology and the knowledge associated with the workplace safety are constantly changing from times to times.
2. The married employees should be reminded to concentrate and dedicate to work especially for the risky task as it will reduce the risk behavior which might be occurred from the performance and eventually affecting the employee's life and the organization's property.
3. The mentoring system should be established to allow the veteran employees to guide the amateur employees especially regarding the issue of work safety as it will improve the safety behavior of the employees.
4. As the safety at work management is contributing to the degree of safety behavior at work of the employees, the organization should be focusing on the safety at work management in the aspect of organizational management, working environment arrangement, work accident prevention and chemicals management.

11.2. Recommendations for Further Study

1. The study should be conducted regarding the work safety of the employees in other industrial estate or categorized into each industrial category in order to compare and confirm which factors are affecting the safety behavior at work of the employee.
2. The investigation for other factors potentially affecting the safety behavior at work of the employees should be conducted.

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