



Occupational health and safety management in small and medium-sized enterprises: An overview of the situation in Thailand

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Abstract

This study aimed to present an overview of the situation of occupational health and safety management in small and medium size enterprises (SMEs) to gain information related to employment, welfare and health facilities, health education, accident statistics, occupational health and safety management and safety activities. A self-administered questionnaire was developed, comprising check-box questions and open-ended questions. The targeted industries were small (20–99 employees) and medium size enterprises (100–299 employees) in Thailand, producing 24 products, which were the most exported products from Thailand during a 5-year period (2000–2004).

One hundred forty responses (22.4% response rate) were received from small enterprises and two hundred twenty-nine (14.7% response rate) from medium size enterprises from 51 provinces all over Thailand. Most of the enterprises arranged several welfare facilities and take good care of health and hygiene of workers. The highest numbers of accident cases were from the production enterprise with 150–199 employees and from the industrial sector of engineering. Essential safety elements for SMEs are accident reports, accident investigation and safety inspections. It is clear that the SMEs in this study had better health and safety management than expected, probably because their products were in the group of the twenty-four highest exporting (by value) commodities of Thailand or they were forced by customers.

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1. Introduction

The number of manufacturing enterprises all over Thailand was 109 598 in 2004 according to the database of Department of Industrial Works, Ministry of Industry. Of these, small size (1–99 employees) and medium size enterprises (100–299 employees) made up 95.91% and 2.70% of the total number of enterprises,

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respectively. SMEs accounted for 98.61% of the enterprises in the whole country. Just as in other countries, most of the production enterprises belonged to small size enterprises (Champoux and Brun, 2003; Seneviratne and Phoon, 2006). The Thai workforce fatal accident rate was still high in comparison to other countries such as Myanmar, Republic of Korea and Indonesia (ILO, 2000). According to the Workmen's Compensation Fund, Social Security Office accident statistics related to work during the year 2000–2004, the number of registered workers increased from 5.42 to 7.39 million and the accident rate per 1000 employees dropped from 33.15 to 29.18. The Workmen's Compensation Fund has to spend a vast amount of money to pay for the cost of accidents and illnesses related to work. With the beginning of the free trade agreements of Thailand with other countries in early 2005, the Ministry of Labour intends to develop safety standards at work for small and medium size enterprises impacted by the free trade agreements. Free trade agreements can greatly expand Thailand's trade and exports, and thus growth opportunities. However, small and medium size enterprises in Thailand will encounter an increasing level of competition, which could result in the crowding out of less competitive industries. The information collected in this study related to current and valid information about trading situation, employment and labor problems and related especially to occupational safety, health and working environment, safety measure at work, guidelines in promoting the development of safety standards at work in small and medium size enterprises in Thailand impacted by the free trade agreement.

This study aimed to provide an overview of the situation of occupational health and safety management in small and medium size enterprises (SMEs) to gain information related to the employment situation, welfare facilities, health facilities, health education, accident statistics, fire prevention, electrical safety management, hazardous working environments, control of industrial hazards, occupational health and safety management, safety training and safety activities provided to workers. It can be used for the ground work for evaluating the occupational health and safety of SMEs in Thailand, especially the SMEs with high potential for export business.

2. Method

2.1. Questionnaire development

A questionnaire was developed comprising check-box questions and open-ended questions. The questionnaire was divided into four sections that covered: (a) information about the enterprise, (b) welfare and health promotion activities, (c) health, safety and environment management and (d) occupational health and safety training. The content of questionnaire was approved by the working committee for this project at the Department of Labour Protection and Welfare, Ministry of Labour. After that, the questionnaires were tested by the master degree students majoring in industrial hygiene and Safety at the department of Occupational Health and safety, Faculty of Public Health, Mahidol University in order to assure that the questions in the questionnaire are simple and understandable. The adjustment of the questionnaire was made following the comments.

2.2. Sample

The targeted industries were small (20–99 employees) and medium size enterprises (100–299 employees) in Thailand, producing 24 products, the 5-year highest value of exported commodities of Thailand (2000–2004) (The database of Export Promotion Department, Ministry of Commerce), which were computers, electrical circuits, automobiles, clothing, natural rubber, rubber products, gems, radios, food canneries, plastic granules, iron, chemicals, air conditioners, rice, plastic products, machinery, sugar, furniture, video, chicken, fax machines, textiles, shoes and shrimp. Enterprises that employed less than 20 employees were excluded from this study, because it is not easy to set up any occupational health and safety management in the enterprises with limited resources, low number of employees and small budget. The addresses, type of enterprises, number of employees, manufactured products were selected from the database of the Department of Industrial Works, Ministry of Industry. Consequently, there were 1469 small size and 6688 medium size industries producing these 24 commodities all over Thailand. A sampling of approximately 2000 enterprises was made, due to the widely different number of each type of production enterprises (24 types of enterprises). When the number of small enterprises in each commodity type was less than 40, or less than 90 for medium enterprises, then all

enterprises in those commodity areas were selected for surveying; if the number of enterprises were more than the number specified, then systematic sampling was used. Finally, 624 small size and 1558 medium size industries were selected for receiving the questionnaire by postal mail. The questionnaires were sent by Occupational Safety and Health Centers in 12 areas all over Thailand. Questionnaires were addressed to the manager of each of the enterprises.

2.3. Data analysis

Data from the questionnaire were coded and analysis. Percentage and mean were used.

3. Results

One hundred forty responses (22.4% response rate) were received from small enterprises and two hundred twenty-nine (14.7% response rate) from medium size enterprises. These responding enterprises were from 51 provinces all over Thailand (Fig. 1). After analysis of the data, the distribution of responding enterprises by size (number of employees) is shown in Table 1. The results show that 89 enterprises of the 369 responses had been enlarged into large enterprises with more than 300 employees; therefore, they are excluded from this study. It was found that 23 enterprises had reduced number of their employees down to less than 20 employees. They were included because they could be grouped into the small-sized enterprises category. This study focused on the one hundred forty small enterprises (1–99 employees) and one hundred forty medium enterprises (100–299 employees). The highest response rate was from Bangkok province (54 enterprises), the next was from Rayong (27 enterprises), Chonburi (23 enterprises), Ayuthaya (23 enterprises) and Samut Prakarn (16 enterprises). The highest levels of responding personnel were senior manager (33.9%), the next was safety officer at the professional level (31.1%) and junior manager (16.7%). The questionnaires came from enterprises producing 24 products except for shrimp. When categorizing the responding enterprises in the industrial sector by size (number of employees), the enterprises that gave highest response rate were rubber and plastic (Table 2). The next was engineering, comprising automobile, iron, machinery and their accessories. The results of worker demographics, welfare facility, health management, accident statistics, fire prevention, electrical safety management, hazardous working environment, control of industrial hazards, occupational health and safety management and safety training of SMEs are presented.

3.1. Labor force factors of SMEs

Enterprises employed male workers with average ages of youngest being 21.5 and the oldest being 44.6 years, with female workers ages being 21.7 and 42.2 years, respectively. Their average working hour was 8.0 h/day (92.1%) and 47.2 h/week. Regarding a number of holiday/week, workers had one day holiday (84.6%), two days holiday (14.3%) and three days holiday (0.4%). Each day, 65.6% of them had one lunch break of 60 min; 8.5% had a 10-min morning break, 60-min lunch and a 10-min evening break; and 9.6% had a 15-min morning break, 60-min lunch and a 15-min evening break. The schedule of the companies daily work schedule ranged from one to four shifts; 50.4% of the companies used only one shift, 29.6% two shifts, 18.2% three shifts and 1.8% four shifts. Each shift worked an average of 8.2 h. Apart from that, 161 enterprises (62.2%) had overtime work with an average of 17.6 h/week ranging from 2 to 80 h/week. Most of the responding enterprises (92.5%) did not have a labor union.

3.2. Welfare facilities

Most SMEs arranged several welfare facilities for workers namely, clean drinking water (98.6%), hygienic cafeteria and eating places (72.5%) with the cafeteria separated from production buildings (64.0%), clean and good sanitation of toilet facilities (98.2%), washing basins (92.9%), resting areas inside the enterprises (73.9%) and company uniform (77.9%). Some enterprises provided changing rooms/locker (61.1%), bathing rooms (58.6%), dormitories (55.7%) and vehicles for commuters (37.5%). It is clear that the enterprises provide

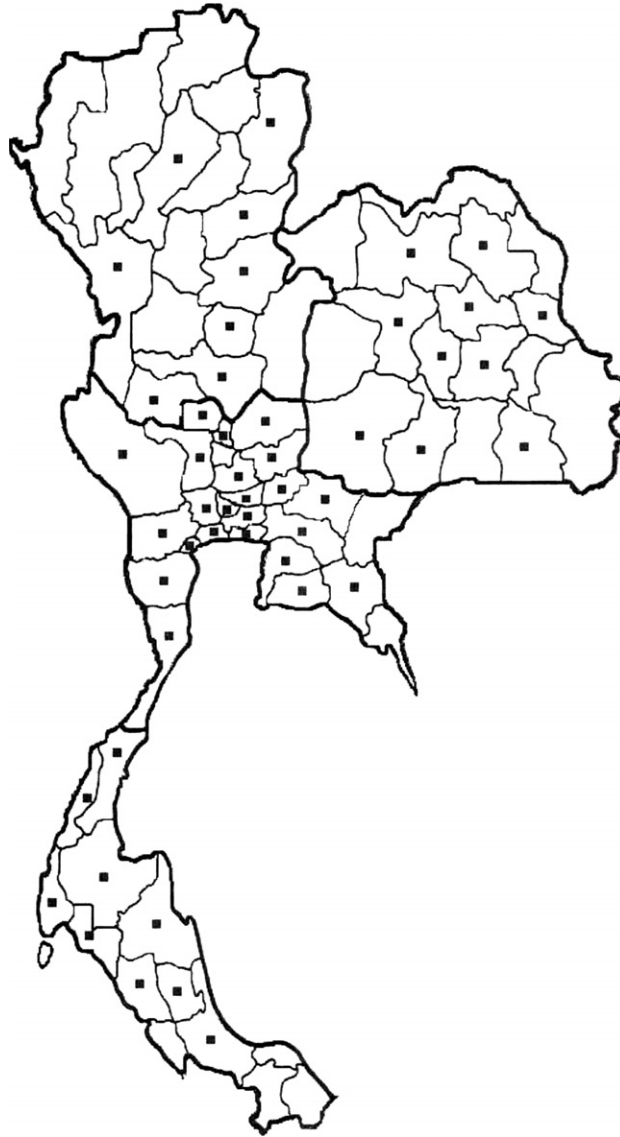


Fig. 1. The distribution of enterprises responding to the questionnaire in 51 provinces all over Thailand (A dot indicates at least one response from the indicated province).

Table 1
Distribution of responding enterprises by number of employees

Number of employees	Responding enterprises
0–19	23
20–49	49
50–99	68
100–149	49
150–199	41
200–249	29
250–299	21
≥ 300	89
Total	369

Table 2
Distribution of responding enterprises by industrial sectors

Industrial sectors	Number of small-sized enterprises	Number of medium-sized enterprises	Total
Agriculture (sugar and rice)	24	9	33
Chemicals	13	20	33
Food (food cans and chicken)	5	5	10
Apparel, textile and shoes	19	15	34
Furniture	8	10	18
Rubber and plastic	27	30	57
Electrical appliance and computers ^a	17	12	29
Engineering ^b	32	19	51
Gem	9	3	12
Other (unspecified products)	1	2	3
Total	140	140	280

^a Computers, electrical circuits, air conditioner, radios, fax machines and video.

^b Automobiles, iron, machinery and their accessories.

necessary welfare facilities for workers; however, only some provide vehicles for workers traveling from home to work places.

3.3. Health management

Almost all SMEs take good care of health and hygiene of workers (Table 3). All workers' health is well taken care of; if an accident occurs or they become sick or develop occupational diseases, they will receive compensation according to the law. Besides, some enterprises provided a health clinic and a person knowledgeable for basic treatment available during working hours (51.1%), keep a workers' health record (57.9%), and provide health insurance or accident insurance for workers (39.6%).

Most SMEs have provided health promotion activities for workers in the enterprises. 67.5% of enterprises provided knowledge and health promotion activities for workers, 71.1% arranged an area for exercise/playing games. Regarding the promotion of a healthy lifestyle for workers, 78.9% of enterprises arranged a stop-smoking project in the workplace, 43.6% of the enterprises provided food preparation safety at the cafeteria. Most enterprises arranged health education sessions for workers related to smoking (74.6%), alcohol and drugs (74.6%), nutrition (57.9%), AIDs (65.7%), stress (53.6%) and exercise (66.8%).

3.4. Accident statistics

The accident statistics of small and medium-sized production enterprises last year classified by number of employees is shown in Table 4. The results showed that the highest number of accident cases was ≤ 1 day lost and >1 day lost from production enterprises with 150–199 employees. The highest number of unidentified sickness case and sickness absence (day) per enterprise was from production enterprises with 250–299 employees. When accident statistics of SMEs were classified by industrial sector (Table 5), the highest number of acci-

Table 3
Percentage of SMEs providing some health facilities

Health facilities	SMEs (%)
Drug and medical supplies	97.9
Vehicle for sending the sick to hospital	91.4
Social insurance fund/ Workmen compensation fund	97.5
Annual health examination	73.2
First-aid training	62.9
Health clinic	51.1
Life or accident insurance	39.6

Table 4

Accident statistics of small and medium-sized production enterprises last year classified by number of employee

Number of employee	<20	20–49	50–99	100–149	150–199	200–249	250–299	Total
Accident case	10	74	198	202	411	236	94	1 225
≤1 day lost case	7	32	124	107	144	106	60	580
>1 day lost case	11	47	67	55	231	87	43	541
Disability case	0	1	3	0	2	1	0	7
Fatal case	0	1	0	1	0	1	0	3
Sickness case/enterprise	0.43	5.29	11.82	13.81	31.05	31.77	52.57	17.24
Sickness absence(day)/enterprise	5.26	16.16	49.53	62.33	123.32	106.18	185.62	66.52
Sickness absence(day)/sickness case	12.1	3.06	4.19	4.51	3.97	3.34	3.53	3.86
No. of employees	274	1 655	5 112	6 073	6 956	6 549	5 678	32 297
No. of enterprises	23	49	68	49	41	22	21	280

Table 5

Accident statistics of small and medium-sized production enterprises last year classified by industrial sector

Industrial sector ^a	1	2	3	4	5	6	7	8	9	Total
Accident case	168	85	13	49	119	296	96	359	12	1 197
≤1 day lost case	97	11	9	104	10	132	64	132	5	564
> 1 day lost case	45	35	2	18	109	136	46	122	16	529
Disability case	0	0	0	2	0	2	1	2	0	7
Fatal case	1	0	0	1	0	1	0	0	0	3
Sickness case/enterprise	17.76	10.24	6	11.32	25.33	14.91	13.21	31.43	5.42	17.06
Sickness absence(day)/enterprise	122.45	41.67	16.3	39.82	91.28	60.44	63.52	85.59	8.75	66.18
Sickness absence(day)/sickness case	6.90	4.07	2.72	3.52	3.60	4.05	4.81	2.72	1.62	3.88
No. of employee	2 476	3 002	973	4 005	1 851	6 946	3 944	7 028	1 757	31 985
No of enterprise	33	33	10	34	18	57	29	51	12	277

^a 1 = Agriculture, 2 = Chemicals, 3 = Food, 4 = Apparel, textile and shoes, 5 = Furniture, 6 = Rubber and plastic, 7 = Electrical appliance, 8 = Engineering, 9 = Gem and Other products.

dent cases, ≤1 day lost and disability and sickness case per enterprise was from engineering, comprising automobile, iron, machinery and their accessories. The second highest rank of accident cases had ≤1 day lost, >1 day lost, disability and fatal cases from the rubber and plastic production enterprises. The second rank of sickness case per enterprise was from furniture producing enterprises. For agricultural production enterprises such as rice and sugar, there was an overwhelming number sickness absence (day) per enterprise and sickness absence (day) per sickness case.

3.5. Fire prevention

Most SMEs (85.7%) had fire prevention and extinguishing plans (Table 6). The result showed that 66.1% of SMEs installed fire alarm clearly heard by all workers. The fire alarm had a significantly different signal from other signals in the workplace. Approximately 87% of SMEs arranged fire extinguishing training for at least 40% of workers, thus following the law, and 77.1% had fire drill and fire evacuation training at least once a year.

3.6. Electrical safety management

Results showed that 74.6% of SMEs made a complete plan of electric circuit in their workplaces certified by local electric authority ready for inspection, 78.6% had warning signs installed in an area where danger from electricity might occur, and ready in case of inspection, repair or installation of electrical system (Table 7). The 83.6% of enterprises put a notice prohibiting any person from pulling the switch handle or locked the switch and 64.9% arranged training about what actions to take when facing with electrical danger as well as first-aid and resuscitation training for workers connected with electricity.

Table 6
Percentage of SMEs provided fire prevention

Fire prevention	SMEs (%)
Fire prevention and extinguishing plan	85.7
Each floor having two entrances and exits	88.90
Unobstructed fire escape route	86.43
Outward opening fire escape doors	48.60
Fire alarm	66.1
Fire extinguishing equipment in enterprises	90.7
Regularly maintaining fire equipment	96.8
Water reserve	72.9
Fire extinguishing training for at least 40% of workers	86.8
Fire drill and evacuation at least once a year	77.1

Table 7
Percentage of SMEs provided electrical safety management

Electrical safety practice	SMEs (%)
Plan of electrical circuit	74.6
Properly maintained electrical wire and equipment	94.6
Electrical warning sign in working area	78.6
Locking and tag process	83.6
PPE for working with electricity	83.3
Training of electricity workers about handling electrical hazards, first/aids and resuscitation	64.9

3.7. Hazardous working environment

Out of 280 SMEs studied, 40% exposed employees to hazardous chemicals, 66.1% exposed them to noise, 51.4% exposed them to heat and 44.3% of the employees had to do monotonous jobs (Table 8).

3.8. Control of industrial hazards

SMEs had control measure or hazard reduction in the working environment using engineering control; results showed that 65.0% of companies had measures for dust reduction and 93.2% installed ventilation systems or ventilating fans (Table 9). The worker rotation was used for 52.5% of SMEs and proper personal protective equipment was provided for 88.2% of SMEs. The working environmental monitoring was carried out for 62.9%

Table 8
Percentage of SMEs exposed to hazardous working environments

Hazardous working environments	SMEs (%)
Hazardous chemicals	41.4
Excess noise	66.1
Working at dangerous elevation	28.2
Ergonomics hazards	34.6
Heat	51.4
Cold	6.1
Confined space and low fresh air circulation	16.1
Working in laboratory	25.7
Hazardous waste	15.6
Infectious diseases	6.8
Lighting quality hazard	35.7
Vibration excesses	19.3
Monotonous job	44.3

Table 9
Percentage of SMEs controlled industrial hazards

Control of industrial hazards	SMEs (%)
Ventilation system or ventilating fans	93.2
Noise reduction measures	67.5
Vibration reduction measures	20.7
Dust control	65.0
Working environment monitoring	62.9
Worker rotation	52.5
Working environment improvement	81.8
PPE for workers	88.2

Table 10
Percentage of SMEs arranging safety management practices in their workplaces

Safety management practices	SMEs (%)
A written safety policy	85.0
Assigned safety responsibilities	87.1
Safety committee	65.7
Full-time safety officer	63.9
Accident report	92.1
Accident investigation	92.5
A budget for safety	66.8
Job safety analyses	77.1
Regular safety inspections	92.9

3.9. Occupational health and safety management and training

Occupational health and safety management was considered essential to prevent accidents and diseases in the enterprises. Table 10 shows that 85.0% of enterprises had written policy and safety regulations for their enterprises and 87.1% informed workers about policy and safety regulations. Furthermore, 88.2% of enterprises defined the role and responsibilities for safety to workers and management at all levels, 72.9% improved policies and assessed practice following a specific policy which could allow policy improvement and updates at any time. Regarding a safety, health and working environment committee for an enterprise, the results showed that 65.7% of the enterprises had safety, health and working environment committees (Safety Committee), 60.7% of them arranged regular monthly meetings and 63.9% employed a full-time safety officer at the professional level to take care of safety matters and to be a secretary of the safety committee. The safety committees (63.9%) worked independently and reported safety issues directly to the top management. In 55.0% of the enterprises, the safety committees had the power to stop the production process, a machine or any unsafe work practice in the enterprises.

When any accident occurred, 92.1% of enterprises reported the accident, 92.5% investigated the accidents but only 75.4% prepared accident report statistics of the enterprise. In addition, 71.4% arranged safety planning from accident statistics and 66.8% set up an annual plan and budget for safety. Owing to remedial actions to reduce accidents at work, 77.1% of the enterprises performed job safety analysis and set up a standard operation procedure, but only 51.1% provided safety operation procedure manuals and distributed them to workers. In addition, 82.1% of enterprises let workers participate in searching for hazards and recommend protective measures to reduce hazards at work in order to help find problems and take remedial action. It is surprising and encouraging to see that 92.9% of enterprises have regular safety inspections in a working area. When planning to bring in a new production process, a machine or a method to be used in the enterprise, its relation to health and safety was considered for 81.1% of the enterprises. Regarding contractors, 49.6% of enterprises had protocol for selection and rules specifying that contractors had to follow related safety rules and regulations. It can be seen that half of the enterprises studied still are not highly concerned about health and safety of contractors. For accident prevention outside the workplaces, only 30.7% of enterprises arranged

Table 11
Percentage of SMEs having managed safety training for workers

Safety training	SMEs (%)
Occupational health and safety training	73.9
PPE training	79.3
Safety training for new or changed workers	82.5
Training for subcontractors	49.6
Training evaluation	61.1
Training improvement after evaluation	59.3

safety programs for commuters. If the enterprises would be more concerned about off work safety, it could make workers safer. In addition, the most five popular safety activities among SMEs are sub-section (individual unit) housekeeping competition, safety exhibition board, safety week, fire prevention training and safety training.

Workers could get information related to safety at work through several forms of mass media, namely a company's public relation board (80.7%), a meeting (79.3%), a training session (70.0%) and a newsletter/company pamphlet (37.9%).

With regards to safety training, results showed that 73.9% of SMEs arranged occupational health and safety training for personnel at all levels, 82.5% providing safety training for new workers or workers with a new task, 79.3% performing training about how to use personal protective equipment, and 49.6% providing safety training for temporary workers or a contractor's workers (Table 11). With regard to personnel responsible for training, companies assigned safety officer (68.9%), foreman (69.3%) and personnel section leaders (56.4%) as trainers.

4. Discussion

In order to increase the response rate, all questionnaires were sent from Occupational Safety and Health Centers in 12 areas all over Thailand and other contacts such as telephone calls to the enterprises were made to increase the response rate. The response rate for this research was low, 22.44% for small size enterprises and 14.06% for medium size enterprises. Some of the questionnaires were returned because the address of the enterprise might not have been updated, or some had been moved or closed down. The other reason of low response rate probably be due to the questionnaire asking whether the enterprises had done related to occupational health, safety and environment according to the law and legislation or not. Some of enterprises may not respond due to fear of auditing. Although the response rate was low, it was similar to a response rate reported by another postal survey distributed to SMEs. Vassie et al. (2000) reported 11.4% and 13.9% response rates for health and safety management of SMEs in UK and Spanish surveys, respectively. A province with a high response rate could be due to those enterprises being located in an industrial estate or that they may be interested in occupational health and safety. The data from the responding enterprises are considered somewhat positively biased because the enterprises interested in safety and health management are more likely to respond to the survey (Vassie et al., 2000). The factory visits for auditing and environmental monitoring were set up for 40 participating exporter enterprises, of which 20 were small and 20 were medium-sized enterprises in order to investigate the actual situation of participating enterprises according to the questions in the questionnaire. It seems that most exporter enterprises visited comply with almost local and some international law and regulations because they have been forced by their customers. Some of them certified with ISO 9000 and ISO 1400. The same reason as small enterprises certified for BS5750 reported by Vassie and Cox (1998). Most persons responding to questionnaires were managers because small enterprises having less than 50 employees were not required by the law to have safety officers at the professional level.

4.1. Labor force factors of SMEs

The workers' age ranges from 15 to 77 and 15 to 63 years for male and female workers, respectively, in SMEs. At the age of 15 years, young people would have only recently graduated from primary school. They

were too young to work in the factory; they were not allowed to work with hazardous chemicals and locations according to the law (SHAWPAT, 2003). The enterprise having older workers may probably due to their expertise or family-own business. Those young (<18 years old) and old workers (>60 years old), were vulnerable groups for hazards in the workplaces, although they were not a significant proportion of the workforce. Champoux and Brun (2003) stated that employees of small-sized enterprises are generally younger, less educated and less experienced than those in large companies, and that this may enhance the risk of workplace accidents.

Overtime is considered important for workers in SMEs because they wanted to have more income. If the enterprises do not provide overtime work, they might move to other places causing a high turn-over rate due to low take home pay. It can be seen that workers in SMEs have to work very hard, for approximately 11 h/day on average, if they do overtime jobs. There were 7 enterprises that had overtime of more than 40 h/week. These groups of workers were not having enough resting time which could lead to accidents. The Ministry Rule under the Labor protection Act B.E. 2541 stated the limits of overtime to be at 36 h/week to protect the health of workers (SHAWPAT, 2003). Most of the responding SMEs did not have a labor union. In Thailand, there is no regulation regarding labor unions in the enterprises; therefore, only 7.5% of the enterprises have a labor union to support and protect the workers with regard to labor issues.

4.2. Welfare facilities

The results showed that 22.5% of the enterprises did not have a cafeteria or eating places for workers; thus workers had to bring some food for lunch or had to find a place to eat outside, probably due to a low number of workers. It is good to see that 55.7% of enterprises provided a dormitory for workers. In Thailand, workers in labor intensive jobs may migrate from rural areas and come to work in big cities. If they are not skilled workers, they may get wages at the lowest wage per day, depending on location of their works for each province as stated by the law. If the enterprises provide a dormitory for these workers, they may have safe and convenient places to live.

4.3. Health management

It seems that the responding enterprises are taking good care of the health of their workers. According to the law, enterprises with ≥ 200 employees are required to have one bed for sick workers, medical supplies and at least one nurse during working hours. In addition, enterprises with ≥ 1000 employees should have two beds and medical supplies, at least two nurses and one vehicle to send the sick or injured workers to hospital. The law required every enterprise to arrange annual health examinations specific to their work for all employees (SHAWPAT, 2003). The annual health examination was carried out for 73.2% of enterprises. Health guidance after the health examination is essential to ensure that employees understand how to improve their lifestyles (Muto et al., 1999).

For health promotion activities, 67.5% of enterprises provided knowledge and health promotion activities for workers. Wilson et al. (1999) carried out a national survey of 3628 US worksites, which stated that approximately 25% of the worksites with 15–99 employees offered health promotion programs to their employees compared with 44% of worksites with 100+ employees. The majority of worksites in both categories had alcohol, illegal drug, smoking protection policies. With regards to health education, it seems that more than half of the enterprises realize the importance of a healthy lifestyle in workplaces as reported by WHO expert committee, which also says that health problems related to lifestyle have been increasingly prominent (WHO Expert Committee on Health Promotion in the Work Setting, 1988).

4.4. Accident statistics

The accident statistics showed that production enterprises with 150–199 employees had the highest number of accident cases, ≤ 1 day lost, > 1 day lost, probably because of this being the highest number of employees in this group. The sickness cases per enterprise and sickness absences (days) per enterprise was highest for enterprises with 250–299 employees. But when compared with the statistics from the database of the Workmen's

Compensation Fund, of the Social Security Office, the highest percentage of workers had accidents or developed diseases in Thailand by enterprise size (number of employees) was 19.93% (41 998 cases) for enterprises with 200–299 employees. The two types of highest risk taking enterprises were engineering and rubber and plastic enterprises. However, considering sickness cases and sickness absences (day), the incidences per enterprise were highest in furniture and engineering enterprises. The extremely high number of the sickness cases and sickness absences (days) might be due to hazardous working conditions in these areas and that these jobs involve hard labor. There is a growing concern about safety at work in most countries in Asia. The results of 5-year industrial distribution of work accident cases in Philippines during 1996–2000, showed that the highest accident cases were from agriculture. Among manufacturing enterprises, food and beverage enterprises had highest accident cases; textiles ranked the second on average (Work accident summary, Bureau of working conditions, 2003). In Indonesia during 1995–1999, manufacturing enterprises had highest rate of accident cases among six types of industries studied which were forestry, mining, manufacturing, construction, electricity, gas & water supply and services (Data based on Department of Manpower and Transmigration and Workers Compensation Insurance).

4.5. Fire prevention

The number of SMEs which had a fire alarm which could be clearly heard by all workers, fire extinguishing training, fire drills and fire evacuation training was too low. All these items are required for all enterprises by Thai legislation. Once the fire accidents occur, the lost could be enormous; for example, a toy factory fire in Thailand in 1993 took 188 lives of workers because the company did not have fire alarm, fire drill and fire evacuation training.

4.6. Electrical safety management

The items asked in the questionnaire are general questions to assess the compliance with the Thai legislation. Hay (2002) reported that the existing Thai legislation was highly prescriptive, in many instances inconsistent and extremely difficult to enforce. He showed as an example part of the Regulation under the Ministry of Interior-Safety in connection with electricity (1972). He also mentioned that these anomalies were also found in the Philippines and in other countries legislation within the region.

4.7. Hazardous working environment

The enterprises reported any items of health hazards in their workplaces as they were perceived and recognized. The factory visits were set up for some of exporter enterprises which participated in this study, 20 for small enterprises and 20 for medium enterprises. It was found that the health hazards reported were realistic. The visit team carried out environmental monitoring for dust, heat, noise and lighting for those enterprises and found most of them complied with the law only in some parameters. Those enterprises therefore still need to improve their working conditions.

4.8. Control of industrial hazards

The questions in this item are general; it is difficult to get the real picture of the enterprises. When they reported that they had done some of the control measures, we actually do not know whether it is effective or not. This is the disadvantage of using the self-reporting questionnaire. However, 62.8% of enterprises monitored their working environments for hazards. The rest did not monitor these. It implies that workers in one third of enterprises studied are taking risks of hazards in their workplaces.

4.9. Occupational health and safety management and training

Actually, all enterprises should comply with all the laws and regulations if the law does not specify the size of enterprises (number of employees). One example of the Thai law states that enterprises with employees

more than or equal to 50 shall employ a full-time safety officer. SMEs usually have limited resources, budgets and investment in comparison to large enterprises. The results showed that 85.0% of the enterprises had a written policy and safety rules. Approximately 20% of the enterprises did not assess the outcome following the written policy and improved the policy; therefore, the written policy has not been updated. Bradshaw et al. (2001) reported that 42.3% of SMEs (<250 employees) in United Kingdom, did not have or had never reviewed a written health and safety policy. In comparison with the work of Bradshaw et al. (2001), one similar aspect to this study was the self-selecting nature of the enterprises but the differences might be due to method of data collection, the manufacturing products of the enterprises and the location of enterprises in different regions. The result showed that 63.9% of the enterprises employed a full-time safety officer; however, some of enterprises did not (21.1%), probably because the number of their employees may have been less than 50. The results showed that 31.4% of the enterprises did not have an annual safety plan or a budget to support safety activities, probably because safety matters are still ranked behind production in some SMEs. Most of enterprises (92.9%) had regular safety inspections. It can be concluded from this study that essential safety elements for SMEs include the accident report, accident investigations and safety inspection. This is because more than 90% of SMEs performed these activities. It is clear that the SMEs in this study had better health and safety management than expected, probably because their products were in the group of the twenty-four highest exporting commodities of Thailand or they were forced to make improvements by customers. Most of them did not have their own brand name on their products. A lot of enterprises in this group were hired to produce exported products of different brand names to other countries. Some of them have their parent companies abroad. They were forced by this relationship to upgrade their occupational health and safety to receive contacts or orders. When comparing the results from this study with the study of Chaikittiporn (2002) for an employer survey of 10 medium-sized enterprises from the garment, metal and plastics sectors, found that the results were similar in some parts. For example, most enterprises had an occupational health policy, safety and health rules, safety and health committees. The difference was that annual health checks rarely occurred, fire response plans were not effective, and safety inspections by factory inspector were infrequent. The differences between these two studies may come from the methods of data collection, size of enterprises, variety of manufacturing enterprises, etc.

The SMEs are an extremely important part of the regions' economy because they employ the majority of the workforce. The problems faced by some SMEs in this study were market share, funds, labour problems, limitation of technology and management problems. The Thai government promulgated the SME's Act and established a SME's Promotion Board in 2000. The SMEs Act states that SME's promotion plans must be undertaken to support both technologies and worker's health. Employers have a responsibility to ensure the safety of their workers. However, millions of workers in SMEs are not sufficiently protected by the existing legislation (Hay, 2002). Harns-Ringdahl et al. (2000) recommended that the strategies for improving safety, health and environment performance in small plants should focus more on the companies with problems.

5. Conclusion

The response rate for SMEs was low. As for labor force factors, a few of the enterprises employed young (<18 years old) and old (>60 years old) workers which were vulnerable groups for hazards in the workplaces. Most of employees do overtime jobs to gain more income. The welfare facilities and health management of participated SMEs were adequate. With regards to accident statistics, the production enterprises with 150–199 employees had highest number of accident cases, ≤ 1 day lost and > 1 day lost. The two types of higher risk creating enterprises were engineering and rubber and plastic enterprises. However, considering sickness cases and sickness absences (day), the incidences per enterprise were highest in furniture and engineering enterprises. For fire prevention, the number of SMEs which had a fire alarm, fire extinguishing training, fire drills and fire evacuation training was too low. With regards to hazardous working environment and controls of industrial hazards, some participating enterprises still need to improve their working conditions. The SMEs had done some of the control measures, but whether they were effective or not is unknown. With regards to occupational health and safety management, it can be concluded from this study that essential safety elements for SMEs include the accident report, accident investigations and safety inspection. This is because more than 90% of SMEs performed these activities. The SMEs in this study had better health and safety man-

agement than expected, probably because their products were in the group of the twenty-four highest exporting commodities of Thailand or they were forced to make improvements by customers or their parent companies. To improve safety, health and environment performance, strategies should focus on SMEs with problems.

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References

- Bradshaw, L.M., Curran, A.D., Eskin, F., Fishwick, D., 2001. Provision and perception of occupational health in small and medium-sized enterprises in sheffield, UK. *Occupational Medicine* 51 (1), 39–44.
- Champoux, D., Brun, J.-P., 2003. Occupational health and safety management in small size enterprises: an overview of the situation and avenues for intervention and research. *Safety Science* 41 (4), 301–318.
- Chaikittiporn, C., 2002. Occupational Safety and Health in Thailand, Working Paper No.2, Strengthening the Role of Labour Standards in Selected Developing Member Countries, Country Report for ILO/ADB RETA Project: 5887.
- Harns-Ringdahl, L., Jansson, T., Malmen, Y., 2000. Safety, health and environment in small process plants-results from a european survey. *Journal of Safety Science* 31 (2), 71–80.
- Hay, D., (2002). Strengthening of Labour Standards in Selecting Developing Member Countries, Regional Review: Occupational Safety and Health, Final Draft. ADB/ILO RETA Project No. 5887.
- ILO, 2000. Protecting and Saving Lives at Work: The Emerging Challenge in Asia. The Asian- Pacific Regional Network on Occupational Safety and Health Information (ASIA-OSH).
- Muto, T., Hsieh, S.D., Sakurai, Y., 1999. Status of health promotion programme implementation in small-scale enterprises in Japan. *Occupational Medicine* 49 (2), 65–70.
- Safety and Health at Work Promotion Association (Thailand) (SHAWPAT), 2003. In: Assembly of Law in Safety and Environment, vol. 1. Creative House Agency Limited Company, Thailand.
- Seneviratne, M., Phoon, W.O., 2006. Exposure assessment in SMEs: a low-cost approach to bring OHS services to small-scale enterprises. *Industrial Health* 44, 27–30.
- Vassie, L., Cox, S., 1998. Small and medium size enterprises (SME) interest in voluntary certification schemes for health and safety management: preliminary results. *Safety Science* 29, 67–73.
- Vassie, L., Tomas, J.M., Oliver, A., 2000. Health and safety management in UK and Spanish SMEs: A comparative study. *Journal of Safety Research* 31 (1), 35–43.
- WHO Expert Committee on Health Promotion in the Work Setting, 1988. Health Promotion for Working Populations. WHO, Geneva, Switzerland.
- Wilson, M.G., DeJoy, D.M., Jorgensen, C.M., Crump, C.J., 1999. Health promotion programs in small worksites: results of a national survey. *American Journal of Health Program* 13 (6), 358–365.