Survey of the necessary competencies and proficiency of safety officers in Thailand

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Abstract: Competency is important for professionals’ effective performance and career development. However, little is known about the necessary competencies and proficiency in these for Thai safety officers. Therefore, this study aimed to identify the necessary competencies for this group and to compare proficiency in each competency between senior and junior safety officers. A descriptive, cross-sectional study was conducted among 73 safety officers using a self-administered questionnaire. Twenty-five competencies were classified as necessary. Mean proficiency scores were higher for senior safety officers than for more junior safety officers for all examined competencies; however, this difference was not statistically significant for ‘first aid’ or for ‘air sampling and analytical methods’. Regulatory compliance was assessed as the most important competency. Gaps between necessity and proficiency were observed in managing safety programs for the junior group. In both groups, proficiency was lowest in the competency of mental health. The results indicate that Thai safety officers’ training needs may be particularly high for regulatory compliance, managing safety programs, and mental health. Lifelong learning is important for enabling occupational safety and health practitioners to fulfill current requirements in Thailand and elsewhere. Multiple training approaches and a specialist qualification program may encourage competency development, especially for junior practitioners.

Key words: Career development, Competency, Occupational safety and health practice, Safety officer, Thailand

Introduction

In Thailand, safety officers are responsible for occupational safety and health (OSH) practices in the workplace. Every employer with 100 or more employees in an individual place of operation is legally mandated to appoint a full-time safety officer with a bachelor’s degree in OSH1). The requirement that safety officers have bachelor’s degrees has been in place since 1985, and, as of 2015, a total of approximately 30,000 safety officers had graduated from 30 universities in Thailand2, 3). Other OSH professionals, whose presence in the workplace is not obligatory, include a limited number of occupational physicians and occupational health nurses4, 5). Therefore, safety officers
play a broad role, fulfilling multiple functions, such as ensuring safety, occupational health, industrial hygiene, and environmental protection at the workplace. General physicians and technical nurses in factories normally do not work in OSH settings; rather, they provide first aid and primary care for injured or sick workers in the workplace6).

Competency is a global concern in relation to professionals’ effective performance and career development7). According to Spencer and Spencer, a competency is “an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation”8). These scholars described the following five elements of the Iceberg Model of Competency: knowledge and skills, which are technical and visible, and motives, traits, and self-concept, which are behavioral and more hidden (the metaphorical submerged part of an iceberg). Numerous studies have developed competency lists for OSH professionals in Asian countries9–15). These competency lists leverage training and education for early-career practitioners. However, these lists are difficult to transfer directly to other counties because the role and function of OSH professionals vary among countries, with differing national regulations, variations in the availability of human resources, and divergent needs for OSH7).

In Thailand, the 2nd National Master Plan on OSH (2017–2021) emphasized the enhancement of safety officers’ skill and performance16). However, little is known about the necessary competencies and the proficiency in these for safety officers. Therefore, the present study had two objectives: to identify the necessary competencies for safety officers in Thailand, and to compare proficiency in each competency between senior and junior safety officers. We chose to make comparisons across groups with different numbers of years of work experience because professional experience is an important factor influencing proficiency11, 12). Our results will suggest a way forward in the development of training programs for safety officers at different stages in their careers.

Subjects and Methods

Instrument

A descriptive, cross-sectional study was conducted among safety officers, using a self-administered questionnaire to identify the necessary competencies and proficiency in these. In this study, we understood competency as “the knowledge, skills, or abilities that define a level of proficiency to practice in the profession”7). We focused on the technical and visible aspects of competency to maximize the scope of the study in terms of measuring proficiency.

The questionnaire items were developed based on a regulation1, course syllabuses, and previous publications on competencies for safety professionals17, 18), industrial hygienists19), and occupational physicians13). Specifically, 12 types of duties for safety officers are listed in Clause 18 of Thailand’s OSH regulation1, and course syllabuses for bachelor’s degrees in OSH were developed by universities, following this regulation. We also reviewed relevant publications and then selected four OSH competency lists that met the study definition: Career Guide to the Safety Profession17), essential knowledge and skills for safety professionals listed in the Safety Fundamentals Examination18), Core Competencies for the Practice of Industrial/Occupational Hygiene19), and the Japanese Society for Occupational Health’s competency list for occupational physicians13). Two of the authors (TI and KH) carefully selected items from these lists if the items related to the safety officer’s duties and study program. Subsequently, three authors who are OSH experts in charge of course curricula (TP, CM, and AK) modified and added to the initial list of items to match the context in Thailand. The items were then translated into the Thai language using standard translation procedures20). The back-translators are listed in the “Acknowledgments” section. Finally, in discussion with all the authors, one author (TI) drafted a competency list of 26 items (Appendix 1).

Participants and data collection

We conducted purposive sampling via email or direct approach using an OSH alumni list for Thammasat University and the researchers’ personal networks from August 1 to October 30, 2019. The inclusion criterion was currently holding an appointment as a full-time safety officer at a company. Ninety-seven people with a valid contact address who held such an appointment were invited to participate in the study. The necessity of each competency was examined using the following question: “How necessary do you feel this area is on the basis of your professional experience?” Each item was rated on a five-point Likert-type scale (5=absolutely necessary, 4=necessary, 3=not very necessary, 2=not very necessary, and 1=not necessary). Proficiency in each competency was assessed by asking “How about your level of proficiency in this area?” Responses were again rated on a five-point Likert-type scale (5=absolutely proficient, 4=proficient, 3=not proficient, 2=not very proficient, and 1=not proficient).
what proficient, 2=not very proficient, and 1=not proficient). Participation was voluntary, and written informed consent was obtained from each respondent. This study was approved by Human Research Ethics Committee 3 of Thammasat University (COA No. 002/2563).

Data analysis

To achieve the objective of this study, the respondents were divided into two groups according to their years of work experience: senior (>5 yr) and junior (≤5 yr). First, we evaluated the necessity of each competency by its mean score for the senior group. The junior group was excluded from this part of the analysis because their limited work experience might not allow them to assess the importance of competencies for the profession. Competencies with mean scores above 3.5 were considered necessary, and those with means below this cutoff point were excluded from the subsequent analyses. This cutoff was based on a previous relevant study\(^{13}\), which showed that 3.42 was the lowest mean score among 50 competencies established for Japanese occupational physicians.

Second, we compared the mean proficiency scores for each item between the senior and junior groups with the Mann-Whitney U test using SPSS for Windows, Version 17.0 (SPSS Inc., Chicago, IL, USA). Two-sided \(p\)-values <0.05 were considered statistically significant.

Results

Table 1 shows the characteristics of the study participants. Of the 73 participants who returned the questionnaire (response rate=75%), 42 (58%) were categorized as senior safety officers and 31 (42%) as junior safety officers. Approximately half of the senior safety officers were aged 30–39 yr (60%), held a master’s or PhD degree (62%), and worked as managers (52%). In contrast, the majority of the junior safety officers were aged 20–29 yr (87%), held a bachelor’s degree as their highest level of education (84%), and were not managers (100%).

Table 2 shows the necessary competencies and proficiency in these for safety officers in Thailand. Of the 26 examined competencies, 25 had mean necessity scores that were higher than 3.5—only the score for biological hazards (3.40) was lower than this. Cronbach’s alpha for the 25 items with mean scores higher than 3.5 was 0.90. Senior safety officers had higher mean proficiency levels, compared with junior safety officers, on all 25 competencies; however, this difference was not statistically significant for ‘first aid’ or for ‘air sampling and analytical methods’. Regulatory compliance, which was the top-ranked competency in terms of necessity, had a lower ranking in terms of proficiency in the senior group, where this competency was in fifth place. In the junior group, managing safety programs ranked relatively low in terms of proficiency (12th place), compared with this compe-


Table 2. Necessary competencies and proficiency in these for safety officers in Thailand

| No. | Necessity of competencies | Proficiency in competencies | p value* |
|-----|---------------------------|-----------------------------|---------|
|     | Necessity of competencies | Senior safety officers (work experience >5 yr) | Senior safety officers (work experience >5 yr) | Junior safety officers (work experience ≤5 yr) |
|     |                           | Mean | Rank | Mean | Rank | Mean | Rank |
| 1.  | Regulatory compliance     | 4.88 | 1    | 3.95 | 5    | 3.35 | 2    | 0.001 |
| 2.  | Risk assessment, risk management, and risk communication | 4.86 | 2    | 4.05 | 2    | 3.19 | 5    | <0.001 |
| 3.  | Accident and incident investigations | 4.81 | 3    | 4.00 | 3    | 3.00 | 8    | <0.001 |
| 4.  | Fire Protection           | 4.71 | 4    | 3.86 | 8    | 3.19 | 5    | 0.003 |
| 5.  | Managing safety programs  | 4.64 | 5    | 3.93 | 6    | 2.74 | 12   | <0.001 |
| 6.  | Emergency response        | 4.64 | 5    | 3.86 | 8    | 3.23 | 4    | 0.005 |
| 7.  | Audits                    | 4.62 | 7    | 4.00 | 3    | 3.06 | 7    | <0.001 |
| 8.  | Training                  | 4.60 | 8    | 4.17 | 1    | 3.35 | 2    | 0.002 |
| 9.  | Management                | 4.57 | 9    | 3.55 | 11   | 2.68 | 13   | <0.001 |
| 10. | Administrative controls   | 4.50 | 10   | 3.93 | 6    | 2.87 | 10   | <0.001 |
| 11. | Personal protective equipment | 4.33 | 11   | 3.79 | 10   | 3.42 | 1    | 0.035 |
| 12. | Health surveillance       | 4.33 | 11   | 3.31 | 13   | 2.52 | 15   | 0.001 |
| 13. | Engineering controls and ventilation | 4.21 | 13   | 3.07 | 18   | 2.52 | 15   | 0.013 |
| 14. | First aid                 | 4.19 | 14   | 3.19 | 17   | 3.00 | 8    | 0.234 |
| 15. | Environmental protection  | 4.14 | 15   | 3.29 | 14   | 2.42 | 18   | <0.001 |
| 16. | Fitness for work          | 4.10 | 16   | 3.29 | 14   | 2.52 | 15   | <0.001 |
| 17. | Indoor air quality        | 4.00 | 17   | 2.86 | 21   | 2.26 | 21   | 0.005 |
| 18. | Ergonomics                | 3.98 | 18   | 3.05 | 19   | 2.55 | 14   | 0.019 |
| 19. | Health promotion          | 3.98 | 18   | 3.24 | 16   | 2.45 | 18   | <0.001 |
| 20. | Noise and hearing loss prevention | 3.88 | 20   | 3.36 | 12   | 2.84 | 11   | 0.009 |
| 21. | Toxicology and human disease | 3.71 | 21   | 2.86 | 21   | 2.19 | 23   | 0.004 |
| 22. | Fatigue management        | 3.69 | 22   | 2.74 | 24   | 2.06 | 24   | <0.001 |
| 23. | Air sampling and analytical methods | 3.69 | 22   | 2.81 | 23   | 2.29 | 20   | 0.051 |
| 24. | Mental health             | 3.60 | 24   | 2.48 | 25   | 1.71 | 25   | 0.001 |
| 25. | Thermal stressors         | 3.57 | 25   | 2.95 | 20   | 2.23 | 22   | <0.001 |
| 26. | Biological hazards        | 3.40† | 26   | 2.95 | 20   | 2.23 | 22   | <0.001 |

*p-value for the Mann-Whitney U test for comparisons of mean proficiency scores between senior and junior safety officers for each competency.
†An item with a mean score below 3.5 was not considered a necessary competency according to the study criteria, and this competency was therefore excluded from the analysis of proficiency.

Tendency’s ranking on necessity (fifth place). The competency of mental health, which ranked 24th in terms of necessity, had the lowest mean proficiency scores for both the senior group and the junior group.

Discussion

This study revealed the necessary competencies for safety officers in Thailand and compared the proficiency in each of these competencies between senior and junior safety officers. Twenty-five of the 26 tested items were classified as necessary competencies in this study. Senior safety officers were more proficient than their junior counterparts in all competencies; however, the difference between these groups was not statistically significant for ‘first aid’ or for ‘air sampling and analytical methods’. We suspect that these areas may be basic enough for undergraduate studies to produce a sufficient level of proficiency. Undergraduate courses on ‘first aid’ normally consist of class lectures, demonstrations, and practice implementing basic life support and other emergency care. For ‘air sampling and analytical methods’, undergraduate courses typically cover sampling in work environments, laboratory analysis, and the evaluation and interpretation of data measurements.

This was the first study to identify the necessary competencies for safety officers in Thailand, who not only engage in safety activities, but also work to ensure oc-
occupational health, industrial hygiene, and environmental protection. Of the examined items, only biological hazards were not considered a necessary competency, with a distribution characterized by platykurtosis (57% thought it was very necessary or necessary, and 21% thought it was not necessary or not very necessary). The mean necessity score of this competency was over 3.0, which corresponds to an assessment of somewhat necessary. We believe that the management of biological hazards is important in some sectors, such as health care and the food industry, but not very important in manufacturing. The other 25 competencies may be relevant for creating an assessment tool for the career development of safety officers in various industries. For example, a specialist qualification program for occupational physicians has been developed in Japan. This program uses a competency checklist to assess each candidate’s skills. The 25 competencies are displayed in the Thai language in Appendix 2.

Regulatory compliance was assessed as the most important competency in the present study. This result is consistent with a previous study in the United Kingdom, which found that regulatory compliance was the top-priority OSH activity for occupational physicians, employers, and employees. Furthermore, the present study found that senior safety officers’ proficiency in this competency was relatively low, compared with its importance: The proficiency ranking for regulatory compliance was 5th for senior safety officers vs. 2nd in junior safety officers, whereas the mean value was higher among the senior officers. This finding suggests that safety officers require educational opportunities to update their information regarding technical standards, codes or practices, and guidelines following new regulations, especially for those who earned their degrees some time ago. In contrast, other studies have identified the top competency for OSH professionals as ethics and attitudes, exposure assessment, or inspection and research. Which competencies are found to be important is often influenced by the adopted model, competency clusters (e.g., cognitive, interpersonal, and intrapersonal) and competency categories (e.g., thresholds and how competencies are differentiated).

The present study found that junior safety officers had lower proficiency in the identified competencies, compared with senior safety officers, especially for the competency of managing safety programs. A post-hoc analysis revealed that this gap was associated with position (manager vs. non-manager) (p<0.001). Basic knowledge of OSH practices can be obtained through lectures and on-the-job training. However, most competencies, including managing safety programs, require additional skills to analyze the situation and propose integrated solutions. These abilities are normally acquired through professional experience. Case-based learning is an effective training approach that facilitates competency development among junior practitioners using group discussions about specific scenarios, typically with real-world examples.

In conclusion, this study developed a list of 25 competencies for Thai safety officers.
tencies for safety officers in Thailand and identified some areas where training needs are high, such as regulatory compliance, managing safety programs, and mental health. The results suggest that lifelong learning is important for allowing OSH practitioners to fulfill the current requirements of their positions. Multiple training approaches and a specialist qualification program may encourage competency development, especially among junior practitioners.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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### Appendix 1. List of competencies examined in the study

| No. | Competencies                                                                 | Description of the competency                                                                 |
|-----|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1.  | Management                                                                  | Apply the principles of cost–benefit analysis, auditing, investigation methods, data management and integration, establishment of policies, planning, delegation of authority, accountability, business acumen, risk communication, organizational structure and culture, and decision making. |
| 2.  | Regulatory compliance                                                       | Ensure that mandatory safety and health standards are satisfied. Record and report safety and health information to meet government requirements. |
| 3.  | Audits                                                                      | Manage safety, health, and environmental audit processes and conduct hazard and system audits.   |
| 4.  | Risk assessment, risk management, and risk communication                     | Implement risk management strategies using the results of hazard identification and risk analyses to eliminate or reduce harmful exposures to people, property, and the environment. |
| 5.  | Accident and incident investigations                                         | Determine the facts related to an accident or incident (near miss) on the basis of witness interviews, site inspections, and the collection of other evidence. |
| 6.  | Managing safety programs                                                     | Plan, organize, budget, and track completion and effectiveness of activities intended to achieve safety objectives in an organization, or implement administrative or technical controls that will eliminate or reduce hazards relating to machinery safety, electrical safety, construction safety, transport safety, and biological and chemical safety. |
| 7.  | Administrative controls                                                     | Recommend and evaluate the effectiveness of administrative controls including written procedures, scheduling strategies, worker rotation, and training. |
| 8.  | Personal protective equipment                                               | Recommend and evaluate the use of personal protective equipment to control exposure using the principles governing the selection, use, care, and limitations of the equipment. |
| 9.  | Engineering Controls and ventilation                                        | Recommend and apply local exhaust ventilation, dilution ventilation, isolation, and process change engineering principles to control chemical, biological, and physical exposures. |
| 10. | Indoor air quality                                                          | Be knowledgeable of the factors that affect indoor air quality, including poor ventilation (lack of fresh, outside air), problems controlling temperature, high or low humidity, recent remodeling that may impact airflow, and other activities in or near a building that can affect the quality of the air in the building. |
| 11. | Air sampling and analytical methods                                         | Select and perform appropriate air sampling/analytical methods for sample analyses and recommendations (e.g., gas chromatography, spectrophotometry, and atomic absorption spectrophotometry). |
| 12. | Ergonomics                                                                  | Identify, evaluate, and recommend controls to mitigate ergonomically stressful jobs using principles from anthropometry, human factors engineering, biomechanics, work physiology, human anatomy, occupational medicine, and facilities engineering, for the purpose of preventing injuries and illnesses. |
| 13. | Fatigue management                                                          | Understand the scientific basis of fatigue, sleep cycles, circadian rhythms, and fatigue physiology, and be familiar with the risk factors associated with fatigue and their appropriate mitigation. |
| 14. | Noise and hearing loss prevention                                           | Identify situations with the potential to cause noise-induced hearing loss or vibration-related injury, and recommend methods to eliminate or control excessive exposure. |
| 15. | Thermal stressors                                                            | Describe thermal strain pathophysiology and hypo- and hyperthermic enviromarkers and biomarkers, recommend comprehensive thermal strain prevention programs, and recognize special human risk factors for heat- and cold-related disorders and deaths. |
### Appendix 1. List of competencies examined in the study (Continued)

| No. | Competencies                        | Description of the competency                                                                 |
|-----|-------------------------------------|-----------------------------------------------------------------------------------------------|
| 16  | Toxicology and human disease        | Apply toxicological principles to evaluate and predict health effects from exposures to single contaminants, mixtures of contaminants, and natural and synthetic agents. |
| 17  | Biological hazards                  | Identify biological agents such as viruses, bacteria, fungi, molds, allergens, toxins, and infectious diseases that are potentially harmful to humans. Evaluate potential exposures and recommend appropriate controls. |
| 18  | Health surveillance                 | Develop, implement, evaluate, and refine screening programs for employees to identify risks for occupational disease or injury and opportunities to promote wellness. |
| 19  | Fitness for work                    | Make referrals for medical conditions or illnesses of workers, and give advice to employers on any necessary work accommodations for ill workers. |
| 20  | Health promotion                    | Manage health promotion programs, assessing their feasibility, implementation of interventions, and evaluation. |
| 21  | Mental health                       | Be able to make an appropriate plan for mental health programs. Handle employees who develop mental health problems, such as depression, and establish vocational rehabilitation models/programs for persons with long-term mental health problems. |
| 22  | Training                            | Provide employees and managers with the knowledge and skills necessary to recognize hazards and perform their jobs safely and effectively. |
| 23  | First aid                           | Demonstrate knowledge of medical care/first aid care in case of emergency.                     |
| 24  | Fire protection                     | Reduce fire hazards through inspection, layout of facilities and processes, and design of fire detection and suppression systems. |
| 25  | Emergency response                  | Organize, train, and coordinate skilled employees with regard to auditory and visual communications pertaining to emergencies such as fires, accidents, or other disasters. |
| 26  | Environmental protection            | Provide knowledge about pollution sources and their control, waste disposal, impact studies, and environmental alteration. |
### Appendix 2. List of 25 competencies for safety officers in Thailand (in Thai language)

| No. | Competency | Description of the competency |
|-----|------------|-------------------------------|
| 1.  | การจัดการ | การประยุกต์ใช้หลักการประเมินความดุเดือด การตรวจประเมิน วิธีการจัดการ การประสานงานและการจัดการข้อมูล การกำหนดนโยบาย การวางแผน การตอบสนอง การวินิจฉัย ตรวจสอบระบบสุขภาพ การสื่อสารความเสี่ยง การจัดโครงสร้างองค์กร วินิจฉัยผลขององค์กร และการพิจารณาตัดสินใจ |
| 2.  | การปฏิบัติตามกฎหมายและข้อบังคับ | การดำเนินการให้เป็นไปตามมาตรฐานด้านอาชีวอนามัยและความปลอดภัย รวมถึงการ จัดทำบันทึกและรายงานข้อมูลที่เกี่ยวข้องตามที่กฎหมายกำหนด |
| 3.  | การตรวจสอบ | การจัดการความปลอดภัย กระบวนการตรวจสอบด้าน ความปลอดภัย อาชีวอนามัย และสิ่งแวดล้อม และดำเนินการตรวจสอบความปลอดภัยของงาน |
| 4.  | การประเมินความเสี่ยง การบริหาร ความเสี่ยง และการสื่อสารความเสี่ยง | ดำเนินการจัดการความเสี่ยง โดยใช้ผลจากการระบุความเสี่ยง และการวิเคราะห์ความเสี่ยงเพื่อเข้าใจหรือลดการสัมผัสที่เป็นอันตรายต่อ คน ทรัพยากร และสิ่งแวดล้อม |
| 5.  | การสอบสวนพฤติกรรมและพฤติกรรมการปฏิบัติงาน | ค้นหาข้อเท็จจริงเกี่ยวกับ ปฏิกิริยา หรือพฤติกรรม (near-miss) ที่ได้จากการสังเกตอาการ ตรวจสอบสถานที่ และการเก็บรวบรวมข้อมูลหลักฐานที่เกี่ยวข้อง |
| 6.  | การจัดการงานความปลอดภัย | การวางแผน การจัดระเบียบ การจัดระบบงาน การจัดตรวจสอบ และประสานกับองค์กรที่เกี่ยวข้อง เพื่อรับรู้ความปลอดภัยของงาน และการพิจารณาตัดสินใจ |
| 7.  | การควบคุมโรคจากการใช้การทางด้าน การบริหารจัดการ | การให้ข้อมูลและประเมินผลการควบคุมโรคด้วยวิธีการทางด้านการบริหารจัดการ เช่น การจัดทำโปรแกรมป้องกันการทำงานที่ปลอดภัย แก้ไขด้านความ ปลอดภัย การควบคุมโรคในงาน และการสื่อสาร |
| 8.  | ดูแลการป้องกันอันตรายด้านบุคคล | การให้ข้อมูลและดูแลให้ปฏิบัติตามกฎหมาย ระเบียบการจัดการภาษาฯ โดยการจัดการด้านการสื่อสาร เพื่อป้องกันการได้รับอันตราย ที่เกี่ยวข้องกับการเรียนความปลอดภัยด้านบุคคลที่เหมาะสม การใช้ป้องกันการสื่อสาร การควบคุม การลดการกล่าวข้อจักข้อของกฎหมายทั้งหมด (เช่นการใช้กฎหมาย) |
| 9.  | การควบคุมโรคจากการใช้หลักการด้านวิศวกรรมและ การประกอบงาน | การให้ข้อมูลและประสานกับผู้รับใช้หลักการทางวิศวกรรมและทางการประกอบงาน การเข้าถึงข้อมูล และการเปลี่ยนแปลงระบบการดำรง หลักการทางวิศวกรรม เพื่อควบคุมดูแลร่างกายการใช้ป้องกัน การอนามัย สิ่งแวดล้อม สิ่งแวดล้อมด้านร่างกายและด้านอากาศ |
| 10. | ดูแลภาวะอากาศในอากาศ | มีความรู้ ความเข้าใจในการใช้การที่จะควบคุมภูมิอากาศในอากาศไม่เหมาะสมว่าจะมีผลกระทบจากอากาศ เช่น การกระทำอากาศที่ไม่เหมาะสม (จากการเดินทางควบคุมภูมิอากาศจากอากาศอากาศ) การควบคุมภูมิอากาศในอากาศในอากาศ ความชื้น การปรับแสงอากาศที่มีผลต่อการไหลเวียนของอากาศในอากาศ และบริการด้านอากาศ ในการที่มี ผลกระทบต่อการควบคุมอากาศในอากาศ |
| 11. | การกันดักอากาศและวิธีการวิเคราะห์ | การเลือกและดำเนินการกันดักและการวิเคราะห์อย่างต่ำกว่าวิธีการที่เหมาะสมในการจัดทำภาระงานด้านอากาศ และให้คำแนะนำด้านความปลอดภัย (เช่น วิธีการวิเคราะห์โดยใช้ gas chromatography, spectrophotometry, atomic absorption spectrophotometry) |
| 12. | การป้องกัน ป้องกันภัยจากอันตรายการเสียหาย ประเมิน และให้ข้อมูลในการควบคุมป้องกันการเสียหายโดยใช้หลักการด้านบุคคลที่เหมาะสมในการป้องกัน การทำงานด้านการป้องกันป้องกันภัยจากอันตราย ด้านควบคุมภัย ด้านสรุปการการทำงาน การป้องกันการเสียหาย การป้องกันการเสียหาย และวิเคราะห์ผลการป้องกันภัยจากอันตราย และการป้องกันอันตรายและการ ป้องกันการเสียหาย |
### Appendix 2. List of 25 competencies for safety officers in Thailand (in Thai language) (Continued)

| Competency | Description of the competency |
|------------|-------------------------------|
| 13.        | การจัดการความเสี่ยงด้านการจราจรทางที่พักอาศัย, และบริการสถานที่พักอาศัย รวมถึงการคุ้มครองทรัพย์สินของประชาชน, การจัดการความเสี่ยงด้านการจราจรที่พักอาศัย, และบริการสถานที่พักอาศัย รวมถึงการคุ้มครองทรัพย์สินของประชาชน | |
| 14.        | เสถียรภาพและการป้องกันโรคที่เกี่ยวข้องจากเสี่ยง | ความสามารถในการค้นหาสถานการณ์ที่มีความเสี่ยงต่อการเกิดการเสียหายหรือการสูญเสียทรัพย์สิน การจัดการความเสี่ยงด้านการจราจร, และบริการสถานที่พักอาศัย รวมถึงการคุ้มครองทรัพย์สินของประชาชน | |
| 15.        | ป้องกันอุบัติเหตุ | ความสามารถในการบริหารจัดการและป้องกันโรคที่เกี่ยวข้องจากเสี่ยง | |
| 16.        | พัฒนาและเผยแพร่ต่อสังคม | ความสามารถในการสื่อสารและการบริการในทางที่พักอาศัย, การจัดการความเสี่ยงด้านการจราจร, และบริการสถานที่พักอาศัย | |
| 17.        | ตามความเพียงพอ | ความสามารถในการสื่อสารและการบริการในทางที่พักอาศัย, การจัดการความเสี่ยงด้านการจราจร, และบริการสถานที่พักอาศัย | |
| 18.        | การสำรวจสภาพ | ความสามารถในการสำรวจสภาพ | |
| 19.        | การป้องกันความเสี่ยง | ความสามารถในการสำรวจสภาพ | |
| 20.        | การสำรวจสภาพ | ความสามารถในการสำรวจสภาพ | |
| 21.        | สำรวจ | ความสามารถในการสำรวจสภาพ | |
| 22.        | การสำรวจ | ความสามารถในการสำรวจสภาพ | |
| 23.        | การสำรวจ | ความสามารถในการสำรวจสภาพ | |
| 24.        | การสำรวจ | ความสามารถในการสำรวจสภาพ | |
| 25.        | การสำรวจ | ความสามารถในการสำรวจสภาพ | |
| 26.        | การสำรวจ | ความสามารถในการสำรวจสภาพ | |