International Labour Organization

SAFETY + HEALTH FOR ALL

Occupational safety and health professionals at the workplace level

A review of qualification systems and regulatory approaches in selected countries

ISBN 9789220391068 (print); ISBN 9789220391075 (web PDF)

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Acknowledgements

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The global literature review and the comparative analysis were conducted by Dr Tristan Casey who also developed the data collection methodology and tools. Research on selected countries was conducted by Dr Tomohiro Ishimaru, Professor Susumu Ueno, Professor Akira Ogami, Dr Kiminori Odagami, Dr Tristan Casey, Pam Pryor, Alizée Charbonneau, Kihwan Oh, Tzvetomira Radoslavova, Yuka Ujita, and Wendy Bailey (Independent OSH Consultant). Information in Asia was collected and translated with support from: Dr Arroon Ketsakorn (Thailand), Dr Bich Diep Nguyen (Viet Nam), Dr Chavinthorn Maiyapakdee (Thailand), Professor David Koh Soo Quee (Singapore), Professor Jungsun Park (Republic of Korea), Dr Nuri Purwito Adi (Indonesia), Dr Twisuk Punpeng (Thailand), and Professor Yangho Kim (Republic of Korea).

The research was conceptualized and coordinated by Alizée Charbonneau. It benefited from technical contributions from Kihwan Oh, Tzvetomira Radoslavova and Yuka Ujita, under the overall guidance of Laetitia Dumas, as part of the ILO project *Improving occupational safety and health (OSH) qualifications frameworks*, funded by the Government of the Republic of Korea, and implemented under the ILO's *Safety + Health for All* flagship programme.

The research team wishes to acknowledge the involvement of all participants and their respective organizations, without whom this report would not be possible. The research team also wishes to thank Pam Pryor (AIHS); Arsenio Fernandez, Senior Specialist, Labour Administration (ILO); and Frédéric Laisné-Auer, Labour Administration/Inspection Officer (ILO) for their active support in the research.

List of Acronyms

Acronym	Description
AIHS	Australian Institute of Health and Safety
ASSP	American Society of Safety Professionals
BCSP	Board of Certified Safety Professionals
CCOHS	Canadian Centre for Occupational Health and Safety
CPD	continuing professional development
ENSHPO	European Network of Safety and Health Professional Organizations
EU	European Union
HASANZ	Health and Safety Association of New Zealand
HSE	Health, safety and environment
ICOH	International Commission on Occupational Health
ILO	International Labour Organization
INSHPO	International Network of Safety and Health Professional Organisations
IOSH	Institution of Occupational Safety and Health
IPRP	intervenant en prévention des risques professionnels
OSH	occupational safety and health
OSHA	Occupational Safety and Health Administration, United States
OSHE	Occupational Safety and Health Expert
OSHO	Occupational Safety and Health Officer
PCBU	person conducting a business or undertaking
SISO	Singapore Institution of Safety Officers
UOEH	University of Occupational and Environmental Health, Japan
VOSHA	Vietnamese Occupational Safety and Health Administration
WSH	Workplace safety and health
WSHO	Workplace Safety and Health Officer

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Executive Summary

Globally, the qualifications required to perform occupational safety and health (OSH) functions within organizations vary considerably. These variations are influenced by factors such as differences in regulation, the role and reach of professional associations, the formalization of ethical practices, and the establishment of qualification frameworks. Knowledge is limited on the approaches and trends that can ensure that OSH professionals have the qualifications to meet the needs of countries and enterprises. Until now, there has been no comprehensive overview of the different elements that make up OSH qualification systems.

To fill this knowledge gap, the ILO conducted research on OSH professional qualification systems in 14 countries from various regions representing a variety of situations: Australia, Canada, France, Indonesia, Jamaica, Japan, the Republic of Korea, New Zealand, Singapore, Spain, Thailand, the United Kingdom of Great Britain and Northern Ireland, the United States of America, and Viet Nam.

This research was conducted as part of a project funded by the Government of the Republic of Korea on improving OSH qualifications frameworks and implemented under the ILO's *Safety + Health for All* flagship programme in line with its *strategy*.

For the first time, this research report will provide a comprehensive summary of OSH qualification systems across different countries. It illustrates the differences and similarities between countries in terms of regulation, professional associations, job titles, duties and tasks, education and training, competence, experience, and professional development, ethical practice, and key themes related to entering the profession and emerging challenges faced by the profession. The report also includes a brief overview of the development of OSH professional regulation and the history of the OSH profession, highlighting the contextual factors that shape it.

The report is intended for government agencies, political decision-makers, organizations of workers and employers, professional associations, training and education institutions, OSH professionals and for any other actor involved in the implementation and development of OSH qualification systems.

The research focuses on professionals with relevant qualifications that provide either safety-related or health-related functions or a mixture of both at the workplace, and who are responsible for the overall safety and health management in the workplace. These personnel could be referred to as "safety and health professionals" appointed by the employer at the workplace to manage OSH.

Research findings reveal significant variations in the **regulation of OSH professionals** across the countries under review. Legislation in Australia, Canada, New Zealand and the United Kingdom is similarly non-specific in their references to OSH professionals. In contrast, the United States (at the federal level) has regulations similar to the principle-based approaches of Australia, Canada, New Zealand and the United Kingdom, but also include provisions for federally regulated institutions and enterprises. On the other end of the legislative spectrum, countries such as Japan, the Republic of Korea, Thailand and Viet Nam, have highly prescriptive requirements for OSH professional roles, each defined with nuanced and specific legislated functions, tasks, and education/training requirements.

European countries like France and Spain have different approaches to regulating the OSH profession compared to Commonwealth countries. French legislation has moderate to general requirements for the role of "competent employee" that employers must engage to assist with OSH duties. An employer without adequate OSH skills or resources can hire a professional belonging to his occupational health service or an external practitioner. Spain has a similar approach, but is more prescriptive in duties, tasks, and education requirements, similar to legislation in South-East Asia. Additionally, Spain and some South-East Asian countries have additional OSH roles with varying and specific capability levels outlined in their national legislation. Obligations on employers in both Spain and South-East Asian countries vary based on criteria such as enterprise size and level of risks.

One South-East Asian country stands out as different – Singapore. Singapore strikes a balance between prescription and flexibility. Specific roles are defined in legislation, along with general requirements regarding training and professional development and minimum standards of qualification for certain roles. However, the specific tasks and duties, as well as the technical specialities required of each OSH professional role, can be adapted and modified to suit the organizational or industrial context.

In most countries where OSH professionals are not legislated, there are significant variations in OSH qualification systems that are driven by **professional associations**, industries, and workers' and employers' organizations. In many Western countries with principle-based OSH legislation, (e.g., Australia, New Zealand, the United Kingdom), profession regulation is achieved informally through professional associations and their membership and certification requirements (e.g., mandatory professional development and minimum qualification levels). These associations provide a range of services that focus mainly on education and training, ensuring competence and ongoing professional development, as well as promoting the profession and profession-related research.

The **education and training** opportunities for OSH professionals across the reviewed countries can vary greatly and involve multiple stakeholders. These stakeholders may include universities, private and public training organizations, professional associations, OSH institutions, and workers' and employers' organizations.

In countries with "soft" or less prescriptive OSH legislation, education and training is a thriving industry with a wide variety of options available. These options include informal training provided by private organizations (e.g., "advanced OSH practice" courses which focus on non-technical skills such as leadership and knowledge of OSH science), vocational courses provided by registered training organizations in both the public and private sectors, and undergraduate and postgraduate degrees offered through universities. The mechanisms for ensuring the quality of OSH education and training can vary but typically include: public audits and inspections of registered training organizations and registration schemes; specified curricula and education topics identified by international and national standards organizations; and third-party auditing. In the case of Australia, there is also a dedicated OSH qualification accreditation board for universities offering OSH courses and programmes.

Among the countries studied, those with highly prescriptive regulations were found to be inconsistent in the enforcement of OSH education and training requirements and the maintenance of course quality. Mandatory training for OSH professionals in these countries is often minimal. In some countries, inconsistencies were reported between required qualifications and actual needs in the workplace. As per the interviews conducted, many countries where education is specified in legislation seem to suffer from issues such as inadequate workplace contextualization and overlap or exhibit redundancy with existing qualifications. This is particularly the case for OSH professionals with extended practical and/or professional experience. In countries applying prescriptive requirements — and those with non-prescriptive training requirements — varying degrees of competence were found between small and larger enterprises.

At a global level, there have been some efforts to establish guidelines regarding the education and experience requirements of the OSH profession coordinated through global **competency and/or capability frameworks**.[1] At country level, the Singapore Government has developed *a Skills Framework for Workplace Safety and Health* (2022) together with industry associations, training providers and workers' organizations. The Framework offers a comprehensive suite of knowledge and skill requirements for different OSH professional roles.

As for **continuing professional development (CPD)**, in most reviewed countries, there are no requirements outside what is required to maintain memberships and/or certifications conferred by professional bodies. These certifications typically specify a minimum number of "points" that must be achieved to maintain status. Different professional development activities (e.g., online training and participation in conferences) may constitute different points. Some professional associations also randomly audit members' professional development to ensure consistency and accuracy.

Only the Republic of Korea, Singapore, and Viet Nam were found to have clear legislative requirements for CPD. In the Republic of Korea, for instance, the employers must ensure that every two years OSH professionals complete a minimum of 24 hours of CPD in enterprises with 50 and more workers, or a minimum of eight hours, in enterprises with 20–49 workers.

Similarly, only six of the 14 countries reviewed require OSH professionals to be **certified and/or registered** by law (France, Indonesia, Japan, Singapore, Thailand and Viet Nam). Certification is generally a system designed to verify and validate competence through a structured assessment process. Registration is keeping an ongoing record of who is practicing in the profession. In most countries reviewed, certification is optional and voluntary for OSH professionals, and primarily used as a mechanism to improve competitiveness in employment contexts. Singapore is different in that it has a government-managed mandatory registration and certification system for OSH professionals.

Research findings revealed that none of the countries reviewed currently have or endorse an **ethical code** as part of their legislation. Instead, it seems that countries rely primarily on professional associations to establish, monitor, and enforce ethical conduct. In those countries without a strong OSH professional association presence and a lack of ethical codes of conduct or standards, there is consequently limited recourse to ensure that high standards are maintained and that practices align with ethical principles.

With regards to **entry into the profession**, the promotion and overall awareness of the OSH profession is currently low globally, according to subject experts interviewed for this research. Interviewees stated that across most countries, OSH professionals tend to enter the profession due to either a personal direct or indirect experience with workplace safety and health or as a later career move after working in an operational or production-oriented role. Furthermore, interviewees agreed that OSH awareness amongst secondary school graduates and tertiary students is generally low and more could be done to increase the visibility of the profession and make it a more appealing and attractive career choice, particularly among university-educated graduates. Initiatives, such as the HASANZ's Health & Safety Generalist Pathway Initiative in New Zealand, are setting examples for other countries of how to promote awareness of the profession.

[1] Two examples are the Occupational Health & Safety Professional Capability Framework compiled by International Network of Safety and Health Professional Organisations (INSHPO) (2017), and the Professional Standards for Safety and Health at Work developed by the Institution of Occupational Safety and Health (IOSH) (2019)).

Key emerging challenges identified in the interviews with OSH experts include the management of psychosocial risks, the changing world of work and job design (such as the gig economy and telework), and the introduction of new technologies with unknown risks. The experts highlighted that psychosocial hazard identification and management traditionally have been excluded from OSH professionals' skill sets, but that this is changing now due in part to the COVID-19 pandemic. The changing world of work also poses challenges for OSH professionals as they will need to adapt to new ways of working and new types of workers such as gig economy workers. Additionally, emerging technologies and public health emergencies are also concerns for OSH professionals as they will need to quickly identify and manage new hazards as they may arise.

Potential for further research and country support

The current research project covered numerous research questions, which were useful in gaining an appreciation of existing national qualification systems. For future research, more in-depth research into OSH qualification frameworks and education could be done, potentially through identifying countries with sophisticated frameworks and analysing their main features in more detail. Other areas of possible research identified include: i) ethical practices within different national cultures; ii) approaches to supervision and effectiveness; iii) identifying required skill sets of OSH professionals in a changing world of work; iv) collaboration modalities between the various stakeholders involved in OSH qualification systems (including policymakers, industry actors, social partners, professional associations and training institutions); v) investigating advantages and disadvantages of different OSH regulatory approaches, including industry-specific regulations; vi) exploring the value of certification programmes; vii) improving options for the promotion of entry into the profession; and viii) the professionalization of OSH.

Multi-stakeholder discussions also concluded that a guide is needed to support developing countries in the assessment and improvement of their OSH qualification systems. Such a guide would take into consideration the various dimensions of OSH qualification systems, including offering different approaches and presenting their advantages and limits. The guide would also be adaptable to different contexts and offer options to respond to the needs of small and medium-sized enterprises in the informal economy.

Introduction

Context

Occupational safety and health (OSH) professionals play important roles in national systems and in management at the workplace level. To ensure that workplaces are safe and healthy, employers may need to secure OSH competence by engaging in-house OSH professionals and/or receive support and advice from personnel within an internal or external occupational health service, or from independent professionals providing OSH consultancy services.

OSH is a multi-disciplinary field and encompasses many disciplines and job types. OSH-related professions include professions such as occupational safety engineers, occupational physicians and nurses, OSH inspectors, ergonomists, occupational hygienists, as well as more generalist OSH professionals who carry out many OSH functions and have job titles such as OSH technician, prevention advisor, expert in risk prevention, Safety Officer, Workplace Safety and Health Officer, and occupational safety specialist.

The roles, functions, tasks, competencies, and education of the various types of OSH professionals and their regulatory context vary significantly across countries and even within countries. Knowledge on approaches and trends to ensure that OSH professionals have the qualifications to meet the needs of countries and enterprises is limited. Until now, there has been no comprehensive overview of the different elements of OSH qualification systems found in different countries.

Against this background, the ILO is conducting research on OSH professional qualification systems. This research is conducted as part of a project funded by the Government of the Republic of Korea on *Improving occupational safety and health qualifications frameworks* and implemented under the ILO's *Safety + Health for All* in line with its *strategy*.

Objectives

The primary aim of this research is to identify the context surrounding OSH professionals and examine the similarities and differences between countries regarding their regulation, education, training, qualification and certification. To identify recent trends, the research compares and analyses existing typologies for various OSH professional qualification systems.

The research findings will serve as a basis for the development of a guide to support countries in the assessment and further improvement of their national OSH professional qualification system. This guide will aim to ensure the availability of suitably qualified OSH professionals, in line with relevant articles[2] of the ILO Occupational Safety and Health Convention, 1981 (No. 155) and the Occupational Health Services Convention, 1985 (No. 161).

Specific supporting activities to achieve this overarching objective include the following:

- Exploring the historical evolution of OSH regulation and the overall profession;
- Investigating what various country legislation specifies in terms of tasks, functions, responsibilities, competencies, experience, certifications, education, professional development, and training of OSH professionals;
- Identifying whether a requirement for an ethical code or standards of professional practice exists for OSH professionals and determining its legislative status, enforcement, and monitoring requirements;
- Identifying employers' legal obligations to recruit, select, and provide training for OSH professionals;
- Identifying, where relevant, the role of OSH professional associations in determining required qualifications, development of education and training programmes, continuing professional development (CPD), and ethical requirements;
- Identifying any barriers or enablers of entry into the OSH profession; and
- Investigating perceptions and expertise of OSH professionals on OSH challenges (e.g., emerging hazards and maintenance of OSH competence).

[2] Convention No. 155, Articles 5, 14, 19, and Convention No. 161, Article 11

Scope

The scope of this research involves reviewing OSH legislation and initiatives within 14 countries: Australia, Canada, France, Indonesia, Jamaica, Japan, the Republic of Korea, New Zealand, Singapore, Spain, Thailand, the United Kingdom, the United States of America, and Viet Nam. The rationale for selecting these 14 countries was to provide a diverse array of arrangements concerning the regulation and qualification systems of OSH professionals in both developed and developing countries, and to cover countries from various regions.

The research focuses on professionals with relevant qualifications that provide either workplace **safety-related functions or health-related functions or a mixture of both, and who are responsible for overall safety and health management.** These personnel could be referred to as "safety and health professionals appointed by the employer at the workplace to manage OSH". This label has been shortened throughout the report to "OSH professionals".[3] For the purpose of this research, the medical professions (such as occupational nurse and occupational physician) and the specialized OSH-related disciplines, such as occupational hygienist, toxicologist, psychologist, and so on, were excluded.

Overview of the report

This report includes a snapshot literature review, comparative analyses, recommendations to inform the development of the guide to assess OSH qualification systems, and suggested areas of future research.

Section 1 summarizes the research approach by outlining the methods used to collect and analyse data. Research limitations are also explained.

Section 2 presents the brief literature review that underpins this project. Specifically, the literature review scope covers: i) a general overview of general OSH regulations; ii) differences in regulation models; iii) evolution of regulations; iv) regulation of OSH professionals; v) historical development of the OSH profession; vi) different approaches to OSH regulations; and vii) various factors that may shape the OSH profession.

Section 3 summarizes the research findings and presents the outcomes of the comparative analyses that contrast with the various aspects of OSH qualification systems, regulation, and education and training across the in-scope countries.

Finally, Section 4 describes the implications of the research, recommendations for the assessment guide, and areas of potential future research.

[3] Examples of personnel included within the "OSH professionals" label in this research include: Safety and Health Officer, OSH coordinator, OSH specialist, OSH Manager, OSH technician, OSH advisor, etc. They could also be referred to as "OSH generalists" who received general training and/or specialized training on OSH.

1. Research approach

The research approach included a combination of desktop document analysis and consultation with subject matter experts within each targeted country. An additional participatory workshop was conducted with a group of OSH specialists, representatives from governments, professional associations and universities across regions to extrapolate the results of the research and answer two key discussion questions: "What are the OSH qualification needs of developing countries?" and "What additional future research is required?".

For document analysis, a data collection protocol was developed collaboratively with members of the research team. The research team consulted country-specific OSH legislation and relevant institutional sources of information and summarized any provisions relating to OSH professional regulations.

For the subject matter expert consultation, a detailed semi-structured interview protocol was developed collaboratively by members of the research team. Between one to four subject matter experts were consulted for each in-scope country through accessing the combined professional networks of the research team. Depending on the country, a variety of experts were included, ranging from government representatives, through to expert OSH professionals and professional association representatives.

Both the desktop review and consultation protocols/tools covered four key areas:

1. the regulatory approach for OSH professional qualifications;
2. the OSH professional role(s);
3. role-specific OSH training and CPD requirements; and
4. ethical practice and standards of practice; and employers' obligations regarding OSH professionals (such as ensuring OSH professionals' competence).

Each data collection element includes a specific question to be answered which is mapped to project objectives. The interview protocol added questions relating to stakeholders' perceptions of emerging challenges for OSH professionals and barriers/enablers to entering the profession. Interviews served to verify the information collected in the desktop review and to guide additional desktop research.

The end-of-research workshop was attended by 34 participants. The workshop started with an extended presentation of the research findings, with a focus on the comparative analyses. Thereafter, two "breakout rooms" were formed, and participants self-selected into one of the rooms. The two facilitators, Dr Tristan Casey and Alizée Charbonneau, led the discussions in each room. Notes from the workshop were collated and used to further validate this report's findings and expand the sections on recommendations and additional research.

Limitations

This research has a few limitations that should be considered when interpreting the contents of the report. First, the literature review was not systematic; therefore, some sources and corresponding themes/insights may have been missed. Second, the consultations with subject matter experts were limited (between one to four people within each country). This means the views represented in this report may be biased by opinion or specific experience. This first research on the topic aimed for breadth and representation of a variety of different country contexts rather than a narrow and deeper exploration of stakeholder experience. However, similar perceptions from interviewees on emerging challenges and barriers/enablers to entering the profession were found across countries, which provides some evidence of validity and generalizability. Finally, information from a few countries was limited which reduced the level of resolution and detail in the findings. Generally, the availability of OSH-related information for each country influenced the level of detail provided in this report (i.e., countries with significant publicly available OSH information are represented in more detail than countries with less information). The desk research did not cover industry-specific legislation and did not cover all state or provincial legislation (where applicable). Additionally, the translations to English of certain terms (e.g., specific job titles in non-anglophone countries) should be read with flexibility. Efforts were made to make the translation as accurate as possible, but interpretation of certain terms and their meaning may vary and may be limited by language barriers (especially for Asian countries).

2. Literature review

The OSH profession has grown considerably from humble beginnings in the early 1900s. Growth in the *number* of professionals has been accompanied by an equally explosive growth in *diversity*. For instance, over 100 different OSH professional job titles have been identified (Brun and Loiselle 2002).

Many scientific and technical disciplines, some more established than others, support OSH in organizations and use the term "OSH professional". International labour standards do not provide an official definition of the "OSH professional" also sometimes referred to as an OSH expert, staff, specialist, or official. Ergonomists, process safety engineers, occupational hygienists, and medical staff (such as occupational nurses and physicians) highlight the diversity of skill sets required to manage OSH.

The ILO's *Promotional Framework for Occupational Safety and Health Recommendation*, 2006 (No. 197) on the promotional framework for OSH speaks of "personnel engaged in the area of occupational safety and health, such as inspectors, safety and health officers and occupational physicians and hygienists". *Occupational Health Services Recommendation, 1985* (No. 171) stipulates that:

> *Occupational health services should have sufficient technical personnel with specialised training and experience in such fields as occupational medicine, occupational hygiene, ergonomics, occupational health nursing and other relevant fields.*

The ILO's *Guidelines on occupational safety and health management systems ILO-OSH 2001* (2009) also suggest the need for designated OSH professionals. The Guidelines adopted the term "competent person" and define it as a person that has suitable training and sufficient knowledge, experience, and skill for the performance of the OSH work involved.[4] The Guidelines advise that certain functions, such as risk assessment and investigation of work-related injuries, ill health, diseases and incidents, should be carried out by competent persons, in consultation with workers and/or their representatives, as appropriate, and in line with OSH competence requirements defined by the employer.

The OSH professionals appointed by the employer to carry out management functions, often referred to in the literature as "generalist OSH professionals", are widely recognized as assuming a core role that coordinates and/or implements advice and support for organizations across domains such as the safety management system, organizational culture, and leadership (INSHPO 2017a; Provan, Dekker and Rae 2017). The OSH professional serves a crucial centralization and integration role by sourcing appropriate technical advice for specific operational issues, formulating strategy and influencing support across an organization, and facilitating both prevention and promotion activities (Pryor et al. 2021). Further, the OSH professional interacts with many different organizational stakeholders (highlighting the interpersonal capabilities

[4] The role of competent person is fully defined by ILO as "a person possessing adequate qualifications, such as suitable training and sufficient knowledge, experience and skill for the safe performance of the specific work. The competent authorities may define appropriate criteria for the designation of such persons and may determine the duties to be assigned to them" [From ILO's Safety and Health in Construction Recommendation, 1988 (No. 175), item 2(g)].

required), covers a wide range of topics, and benefits from a large degree of role autonomy. However, they are also subject to frequent interruptions, carry many duties and responsibilities, and bear a heavy administrative burden due to legal compliance requirements (Van Wassenhove, Foussard and Denis-Rémis 2022).

Many industry associations divide the "OSH generalist" into two complementary roles: the professional and the practitioner, according to INSHPO (2017a):

- The OSH professional is typically university-educated, undertakes duties relating to strategy, influencing, coaching, and management.
- The OSH practitioner is typically vocationally trained, operationalizes or translates strategy into action and tends to provide more line-relevant technical advice and support.
- Traditionally, the OSH professional holds positions in management (e.g.,Principal or Lead Advisor or Manager), whereas the OSH practitioner tends to be in roles closer to frontline operations (e.g., Advisor or Coordinator).[5]

Although some researchers have until recently challenged the idea that OSH is an established profession, a recent review strongly suggests that professional status has been established, particularly in countries with advanced economies and regulations (Van Wassenhove, Foussard and Denis-Rémis 2022). According to Ferguson and Ramsey (2010), a profession exists when there is a body of knowledge (technical information that underpins practice), one or more professional bodies that decide on requirements for entry into the profession, and an accepted code of conduct including professional ethics. In many countries, these conditions have been either partially or completely met for the OSH professional.

Importantly, this professionalization runs counter to the legislative context in some countries. For instance, in many advanced economies like Australia and Canada, although there is wide recognition of OSH as an established profession, the implementation of goal- or objective-based OSH law means there is less prescription regarding the duties of employers to employ OSH professionals or verify their qualifications and training (Provan and Pryor 2019; Wright et al. 2019). Currently, in these countries and many more, anyone can label themselves as an OSH professional, it is an unprotected title (Pryor et al. 2021). In other developed economies, such as Singapore, there are prescriptive requirements surrounding the use of OSH-related titles and the associated education and training standards.

This literature review charts the high-level development of general OSH regulation globally and identifies key trends. This section sets the scene for consideration of professional regulations and provides some insights into why the trajectories of the OSH profession differ internationally, followed by a focus on regulations. Finally, Section 2 concludes with a summary of literature sources that examine key factors shaping the OSH professional's role: economic, social, regulatory, professional, and lastly, industry factors.

[5] In this current research, both OSH professional and OSH practitioner (as traditionally defined) are combined into one overarching category.

2.1 Overview of general OSH regulation

Regulation is a process of bureaucratic legalization of rules and the monitoring and enforcement of these rules (Guidi, Guardiancich and Levi-Faur 2020). Although there are no international labour standards that reflect Member States' agreement on the regulation of OSH professionals, Article 5(c) of Convention No. 155 stipulates that the "policy" referred to in Article 4 of the Convention:

shall take account of the following main spheres of action in so far as they affect occupational safety and health and the working environment (…) training, including necessary further training, qualifications and motivations of persons involved, in one capacity or another, in the achievement of adequate levels of safety and health.

Therefore, ensuring the competent and effective performance of OSH professionals is clearly a priority at an international level.

At a high level, OSH regulation can be divided into two main approaches: "soft" and "hard" (Lindøe and Baram 2019). Hard regulation's purpose is to enforce compliance with prescriptive legal requirements. This approach is characterized by government development and enforcement of detailed prescriptive rules in a command-and-control fashion (Lindøe and Baram 2019). Soft regulation aims to foster co-regulatory risk management and socially responsible risk management (Gilad 2010). To implement soft laws, industry and regulators look at technical and management standards, guidance, and norms.

Further detail within these broad regulatory approaches is apparent. As described in the ILO's *Support Kit for Developing Occupational Safety and Health Legislation* (2021), five approaches to OSH legislation have been adopted by various countries globally:

- ***Specification standards***: detailed and specific prescriptive rules that outline the specific actions (e.g., risk controls) that must be implemented
- ***Principle-based***: key ideas or basic concepts that should be incorporated into risk management and prevention activities
- ***Outcome-based***: a result or achievement that should be attained without prescription on how it is done
- ***Performance standards***: providing boundary conditions around limits or thresholds that must not be exceeded
- ***Process or management standards***: activities or processes that must be implemented as part of a broader OSH management system framework

Modern OSH frameworks do not rely on one or another type of standard exclusively but integrate all of them (ILO 2021).

Factors that impact the nature of regulation within countries include administrative paradigms, the legal system, political institutions, the economic system, and the characteristics of industries being regulated (Guidi, Guardiancich and Levi-Faur 2020). Consequently, there is much variation in the specifics of OSH regulation globally. In Section 2 some of these important differences are explained.

Accounting for the differences in OSH Regulation Models

A key factor that influences country-level differences in OSH regulation is the economic model (Clahsen et al. 2019; Guidi, Guardiancich and Levi-Faur 2020; Rothstein et al. 2019 and 2022). Each economic model has relative strengths and weaknesses, and arguably, specific implications for OSH regulation.

Liberal market economies, or an "uncoordinated market model" offer weaker welfare and labour market protections than coordinated market economies (Rothstein et al. 2022). Rhineland models, otherwise known as coordinated models, are typified in the Netherlands and in Finland and Sweden. The aim of the coordinated model is to realize social rights for all citizens, promote equality, high social standards, and provide strong social benefits that are independent of class or status (Steurer, Martinuzzi and Margula 2012). Organizations tend to be led in flatter, more egalitarian models where consultation and workforce involvement in decision-making is emphasized (Haxhi 2015). This distinction is likely due to differences in competitive economic strategies. For instance, coordinated economies invest more in developing enterprise- and industry-specific skills, which results in greater incentives to protect these investments. Alternatively, liberal market economies have greater flexibility, meaning that skills can simply be replaced or sourced externally. Organizations tend to focus more on efficiency and are usually led in a hierarchical and top-down manner (Haxhi 2015).

Following on from the work of Rothstein and fellow authors (2022), economic models and approaches to state welfare/benefits as outlined above have implications for the governance and oversight of OSH. For instance, the United Kingdom, considered by Rothstein et al. (2022) as an uncoordinated market economy, has responsibility for OSH regulation concentrated in state-based labour inspectorates that employ an "enforcement pyramid" of sanctions and education activities designed to promote compliance. In France and Germany, which have adopted a coordinated system, there is a stronger role for government in driving OSH outcomes through encouraging partnerships between unions, employers, and government. Coordinated economies emphasize non-state enforcement models and compliance levers such as risk-based insurance premiums and additional compliance inspectors provided by insurance agencies.

Evolution and maturation of OSH regulation

Within countries that have a long history of OSH protections and provisions, regulation has progressed through staged evolutions (Chen et al. 2020). Each major OSH-supporting country has had different evolutionary trajectories, reflecting their unique context. However, most of these countries have progressed from a prescriptive and legally oriented system to a goal- or outcome-based system. This outcome-based system eventually has incorporated strong tripartite and consultative arrangements to improve stakeholder engagement and overall compliance. Across OSH-mature countries, Chen and fellow authors (2020) point out that the different general OSH regulatory evolution includes the following:

- ***North America:*** Strong role for professional technical associations setting standards and guidelines and influencing the direction of OSH regulation
- ***United Kingdom:*** Historically, a legislatively heavy framework with government enforcement before revolutionizing the OSH landscape through developing goal-based regulation more recently
- ***Japan:*** Government-dominated role moving towards less prescription and growing industry responsibility for accident prevention
- ***Germany and France***: Important role played by workers' injury compensation insurance, and partnerships between government and research institutes to design effective legislation
- ***Nordic countries***: Ideological approach founded on strong principles of workforce protection and participation, and reflexive regulation (i.e., continual reflection and reinvention and/or redevelopment over time)

2.2 Regulation of OSH professionals

Countries differ markedly in their approach to the regulation of OSH professionals. In many industrially advanced countries, regulation can be inconsistent and rare. Most western Commonwealth countries have adopted the high-level goal- or principle-based approach pioneered by the United Kingdom. This approach offers considerable flexibility and ensures contemporary ideas and practices are woven into the capabilities of OSH professionals. Other countries, typically in South-East Asia, with some European examples, have adopted a more prescriptive approach, which arguably protects the profession more stringently, as well as ensures consistency in education, training, and qualification. The following charts the historical overall development of the OSH profession and then briefly introduces some key differences in professional regulations, outlining their respective strengths and weaknesses.

Historical development of the OSH profession

As a sweeping generalization across most Western countries within the past century, the OSH profession has historically adopted a technical and engineering-based identity in high-risk industries (Swuste et al. 2021). Indeed, OSH professionals have been promoted since as early as the 1920s-30s through the work of Heinrich, who argued for the inclusion of safety topics into engineering disciplines (Swuste et al. 2021).

Across many countries, the OSH profession emerged in the 1970s as a semi-scientific discipline, as safety was finally conceptualized as a complex field worthy of empirical study. Focus shifted from safety being a purely technical and practical endeavour, to something that could be studied, investigated, and theorized about. Its scope expanded from engineering and physical sciences to include psychology, human factors and ergonomics, management science, and a raft of other areas (Dekker 2019). This expanding scope and intellectual inquiry, in turn, drove increasing sophistication and a broadening of the OSH professional's role.

Swuste et al. (2019) outlined four "generations" of OSH professional maturation. Initially, safety inspectors appointed by companies as a direct response to emerging and early OSH technical requirements and regulations morphed into practically oriented "safety technicians".
The second generation of OSH professional saw increased collaboration and cross-pollination between safety technicians and other disciplines like occupational hygienists, nurses, and physicians. Again, the role broadened to include aspects of occupational disease surveillance and prevention.
Thirdly, the "safety officer" emerged in the 1970s and 1980s, who generally received higher levels of education. Academically trained OSH professionals started to enter the market, especially in traditionally high-risk industries where the threat of disaster was prominent (e.g., oil and gas, mining, electricity production and distribution, nuclear power).

The final and fourth generation generated the "safety consultant". The safety consultant was mostly concerned with the organization as a holistic system (e.g., a suite of interconnected and interacting parts), and optimizing the performance of its employees. Essentially, the most modern evolution of the OSH professional is positioned as a "business provider with safety expertise" (Swuste et al. 2019).

Similarly, Hale and Booth (2019) described three core types of OSH professional: i) the technical expert (tactical and interacting with workers in small-medium businesses); ii) the safety professional (operating at strategic management levels); and iii) the safety consultant (helping to solve complex OSH problems).

The soft approach to OSH professional regulation

The soft approach is characterized by countries such as the United Kingdom and Australia and involves less prescription in various acts and regulations. Professional legislative provisions are general obligations on workers to demonstrate adequate competence in the performance of their job duties. There are generally no requirements for persons operating a business to employ an OSH professional — apart from some minor provisions regarding the availability and provision of competent advice to management regarding OSH matters in some national legislation in the United Kingdom (Pryor, Hale and Hudson 2019).

This soft approach has provided the OSH profession, employers, and government regulators with a certain amount of freedom in educating, training, and qualifying OSH personnel. This flexibility means that as science and practice mature, legislation does not need to be updated or amended (a process that is often lengthy and expensive).

For governments, a soft legislative regime means that the duties of regulating the OSH profession are delegated to professional associations, and to some extent, industry organizations. For employers, the OSH professional role identity and function can be customized to their unique organizational context, ensuring maximum local relevance. And lastly, a soft approach means greater availability of training and professional development options, and potentially, job enrichment through the myriad of professional pathways and specializations that are possible.

Despite this flexibility, the soft approach can carry some weaknesses, mainly in the form of risks to the profession's integrity and credibility. Without clear regulation, the OSH professional title is unprotected, and subsequently, under- or un-qualified or incompetent persons can enter it and potentially cause loss of life, reputational damage, and costly legal action for their employers. Employers may hire employees who purport to have OSH skills but may lack required knowledge and/or skills. For OSH professionals, a lack of clear regulation affects a diverse array of job titles, functions and purposes, as well as many different training and professional development options. Many professionals or those seeking to enter it may suffer from a lack of clear identity (Provan, Dekker and Rae 2017). Further, superficial interpretation of an OSH professional's role by employers and industry (e.g., as a purely compliance role) generally means that some personnel may get bogged down in administratively heavy jobs that add little value to the safety of frontline work (Provan et al. 2017; Provan, Woods, Dekker and Rae 2020).

The hard approach to OSH professional regulation

The hard approach to regulation means that the legislative framework has specific provisions regarding what the OSH professional's role is, how they should do it, and/or the requirements for training/experience, professional development, and ethical conduct. This regulatory approach is more common in Asia and some European Union (EU) countries. Such an approach sends a strong message to employers (and the OSH profession more broadly) regarding the importance of engaging with qualified, competent, and capable OSH resources.

The mixed approach to OSH professional regulation

The mixed approach employs a combination of prescription and flexibility. One example is the legislative context of the United States, whereby technical standards and requirements (developed by mainly professional engineering associations) were later enshrined into law through regulations, and thereafter loosened in some respects with the global dissemination of goal-based approaches. However, the close linkages between professional (mainly engineering) associations and government regulation of OSH remain strong. Although the OSH profession is not specifically regulated in private industry, there are prescriptions for federal agencies which specify the various role titles (providing a sense of role identity and clarity) and the mandatory training and education that employers should provide.

Is change on the horizon?

Importantly, recent academic and professional publications have stressed that the OSH profession should indeed be more tightly regulated in western Commonwealth countries, or those dominated by liberal market economies. For example, Wright and fellow authors (2019) expressed concern over the lack of regulations specific to OSH professionals in Canada. This creates inconsistency in who can call themselves an OSH professional and what skills, knowledge, and overall capabilities are required to successfully execute the role. In Australia, regulators have raised similar concerns about OSH professionals' advice and competence (Pryor, Hale and Hudson 2019). Relatedly, Provan and Pryor (2019) claimed that in Australia there is a growing gap between OSH regulation and practice; signifying that a variety of people either with or without suitable qualifications can, and are currently, practicing OSH in high-risk settings. Finally, Hale and Booth (2019) have stated that since 2009 in the United Kingdom, 22 disciplinary cases have been brought against IOSH members, resulting in 18 expulsions from professional associations.

Taken together, there seems to be a range of reasons why an exclusively goal- or principle-based approach to OSH professional regulation may not be the most appropriate approach, especially for developing countries where the OSH profession is not yet well established. An absence of prescriptive regulations governing the profession means less control over who enters it, and greater inconsistency in the quality of persons engaged in OSH roles.

Section 2.3 presents the major factors that shape the regulation of OSH professions in mainly developed countries, where most available literature is found. Considering all key factors across societal, regulatory, professional, and industry levels, can provide insights on how these factors may be influenced and shape the OSH profession.

2.3 Factors shaping the OSH profession

Economic factors

In advanced economies like Australia where there is a high dependency on high-risk sectors like mining, oil and gas, and construction, economic cycles can create a "boom and bust" experience for OSH professionals (Provan and Pryor 2019). As economic conditions worsen, companies shed OSH resources to reduce costs. Interestingly, anecdotal evidence suggests that this can facilitate skill transfer and increased capability as OSH professionals from one industry (e.g., mining) switch to other industries where they can apply their generalist skills (e.g., construction or manufacturing). In boom times when the economy is strong, unprecedented demand for OSH professionals can mean that some personnel gain employment in roles for which they are not competent, unfortunately introducing vulnerabilities into high-risk environments.

Social factors

National culture is another factor that may shape the OSH profession, although research on this topic is virtually non-existent. Some studies have shown that national culture may play a role in regulation and may also interact with organizational culture to produce unique beliefs about safety and how it should be achieved in practice (Yorio, Edwards and Hoeneveld 2019). Finally, major industrial disasters can shape public or societal opinion, bringing awareness to the importance of OSH professionals and through public pressure, and bringing about legal, industrial and professional changes (Pearce and Tombs 2019).

Regulatory factors

Global trends toward less prescriptive regulation seem to have created increased demand for OSH professionals (Hale, Borys and Adams 2015) as companies seek to interpret vague or general requirements and translate these into specific activities and actions. An absence of regulation for OSH professionals, and OSH generally, can actually drive increased demand, professionalization, and capability. This occurs because organizations engage or hire OSH professionals to assist them in navigating, interpreting and complying with OSH legislation.

In other countries where OSH legislation is highly prescriptive (such as in some Asian countries), the national government is capitalizing on the efficiency and control advantages of centralization by issuing requirements (in the form of law), guidance, policies, and facilitating cooperation between universities and industry (Motalifu et al. 2022). These efforts are aimed at building adequate capabilities primarily among engineers involved in process safety across high-risk settings like mining and chemical manufacture. Others like China have adopted a more critical stance on highly prescriptive and government-led models by highlighting the lack of trust between industry and regulators and poor worker consultation mechanisms (Chen et al. 2020).

Professional factors

There is a deep and ongoing debate in the safety science community regarding the professional status of OSH personnel. Generally, the professionalization of a role requires: i) a service orientation; ii) an ethical code and enforcement; iii) a body of knowledge specific to the profession: iv) structured and consistent education and qualification; and v) ongoing professional development and learning (Ferguson and Ramsay 2010). Academics vary in the professionalization criteria that they apply and their assessments, but the majority suggest

that OSH should be considered a profession (Pryor et al. 2021). There is wide recognition of the OSH professional by global organizations like INSHPO which established its *Occupational Health and Safety Professional Capability Framework* (2017a) to guide OSH education and training (see also Pryor, Hale and Hudson 2019). OSH professional associations frequently shape regulation, education and qualifications for their members (and the broader discipline) through membership requirements, lobbying to governments, and certification programmes.

Industry factors

Various industries can facilitate professional training and capability development of the OSH profession, particularly in countries with goal-based legislation. Without specific prescriptions regarding OSH professional education, training or experience, industry may set its own standards. Major multinational companies typically implement advanced OSH training programmes that may be delivered in partnership with academic institutions such as the Industrial Risk Management post-master education programme at MINES Paris PSL University (Van Wassenhove, Foussard and Denis-Rémis 2022) and the post-academic course *Management of Safety, Health and Environment (MoSHE)* at Delft University of Technology (Swuste and Sillem 2018). Further, OSH professionals often transition between different industrial employment settings as jobs become available and they seek diversity of career experiences (Pryor et al. 2021). Cross-pollination of skills across organizations and industries is often the result. However, in small or medium-sized businesses, an OSH professional may find their role relatively insulated from education and training opportunities, and generally requiring fewer qualifications for low-level jobs (e.g., certificates and other vocational training).

2.4 Literature review summary

Overall, this focused review has mapped the landscape of the OSH profession from a high level. It has summarized the development and major features of three main approaches to regulating the OSH profession: i) soft (goal- or principle-based); ii) hard (prescriptive); and iii) mixed approaches. Further, the various factors that shape OSH professional regulation and practice have been summarized, ranging from macro factors like the economy model in place within a country, down to meso factors related to professional identity and industry issues. From this broad contextual background, the research builds on the insights discovered so far and Section 3 presents the specific and integrated research findings of the comparative analyses.

3. Findings of the comparative analyses

In this section, the findings of various comparative analyses are presented, along with analyses and descriptive summaries (typically presented as tables). Further extended written commentary compares and contrasts the selected countries on each reviewed characteristic.

3.1 Regulation of OSH professionals

Across the 14 countries reviewed, a wide variety of arrangements concerning the regulation of OSH professionals was discovered. A summary of these arrangements is provided in Tables 1 and 2.

Table 1. Regulation approach to OSH professionals, by country

Country	Summary of OSH Professional Regulation
Australia	There are no specific provisions in the national *Work Health and Safety Act*, 2021 relating to OSH professionals, apart from some general obligations that they may fall into, such as responsibility for "Due Diligence of Company Officers", and general duties upheld by all workers. At a state/territory level, Victorian legislation *(Occupational Health and Safety Act, 2004)* states that appropriately qualified persons for OSH management must be engaged. Western Australian legislation *(Work Health and Safety Act,* 2020) states OSH service providers (i.e., OSH professional consultants) must not put workers at risk. Queensland legislation states that employers may employ an OSH professional.
Canada	While there are no specific references to OSH professionals in Canadian federal legislation *(Canada Labour Code, 1985)*, they may not be excluded from acting in the role of an OSH committee member or workforce OSH representative, both of which have specific provisions regarding their duties and obligations under federal law. In the *Canada Occupational Health and Safety Regulations* (1986) there is a specific reference to employers engaging a suitably qualified person for inspection and verification of safety-critical tasks and equipment. These only apply to federally regulated work and undertakings. Provincial legislatures were not studied for this research.

Country	Summary of OSH Professional Regulation
France	As set out in the *Code du Travail*, the employer is responsible to ensure the safety and health of employees. To meet this responsibility employers may rely on the assistance of multiple internal and external resources, including occupational health services (INRS 2019). Within the enterprise, the *Code du Travail* (Arts L. 4644-1 and R. 4644-1) requires that the employer appoint one or more "competent employees" to take charge of occupational risk protection and prevention activities. The Code du Travail includes some provisions regarding the training that the "competent employee" may request or receive, and the circular of the Ministry of Labour of 9 November 2012 includes general provisions on their role and tasks. If the skills in the company do not allow these activities to be organized, the employer may call upon an occupational risk prevention practitioner (IPRP) belonging to an occupational health service or duly registered with the competent administrative authority. The *Code du Travail* includes provisions on the general role and tasks of the IPRP, making distinction between the external IPRP called for a specific task and the IPRP employed within the occupational health services, as well as provisions on the registration requirements of the independent IPRP.
Indonesia	There is moderate to low prescription of OSH professionals. Only the OSH Expert is defined in Indonesian law *(Ministry of Manpower Regulation No. 2, 1992*, Article 9) in which the general role and task requirements are specified. High-level requirements regarding competence and experience are outlined. Approved training institutions may educate OSH professionals.
Jamaica	No specific roles nor requirements are identified regarding OSH professionals' education and training or other aspects.
Japan	Specific roles are identified in OSH legislation and regulation in Japan: Safety Officers, Health officers, and Safety and Health Advocators (*Ordinance on Occupational Safety and Health,* 1972). Different roles are required depending on business size and industry. Education and qualification requirements are highly prescriptive.
New Zealand	New Zealand OSH regulation is principle- or goal-based, with nothing specific to OSH professionals *(Health and Safety at Work Act,* 2015).
Republic of Korea	The Republic of Korea has highly prescriptive legal requirements regarding OSH in the workplace *(Ordinance of the Occupational Safety and Health Act,* as amended on 19 November 2021). Employers are required to engage "Safety Officers", "Health Officers", and "Safety and Health Staff" according to the type of industry and number of regular employees at each workplace. Roles, functions, tasks, and education and training requirements are all prescribed by law. CPD is also regulated.

Country	Summary of OSH Professional Regulation
Singapore	Legislation balances prescription with flexibility. There are prescriptions regarding the kinds of OSH professionals to be appointed for certain types of workplaces, but the details are not exhaustive *(Workplace Safety and Health (WSH) Officers Regulations*, 2007). There is some flexibility for employers to shape the implementation of OSH resources within their businesses. Prescribed OSH professional roles exist in legislation: WSH Coordinator and WSH Officer. General tasks, duties, education, training, and CPD requirements are legislated (mainly for the WSH Officer).
Spain	One core OSH professional role is prescribed in Spain with three levels of capability undertaken by an OSH Technician who carries out tasks at basic, intermediate, or advanced levels (Preventive Services Royal Decree, 39/1997). Prescription regarding roles, tasks, education and experience requirements is also present. Further, Spain appears to be a country that has witnessed some litigation cases with respect to prosecuting OSH professionals who have been negligent in executing their tasks.
Thailand	Five different OSH professional roles are prescribed, all concerning the Safety Officer but with various levels (*Occupational Safety, Health and Environment Act,* 2011). Training topics and hours are legislated, along with tasks and duties. Although CPD is technically legislated, it appears not to have been implemented. Employers are required to register Safety Officers with the government.
United Kingdom	Rather than referring specifically to an OSH professional role, the *Health and Safety at Work Regulations* (1999) mainly require that an employer implement appropriate OSH arrangements, giving due consideration to the nature of business activities and business size. These arrangements are aimed at enabling effective planning, monitoring, control, and review of preventative and protective measures. Employers must appoint suitable OSH advice and support.
United States	There is a balance between the goal- or principle-based *OSH Act* (1970) and prescriptive technical standards and regulations. The research found that only federal agencies have specific provisions related to OSH professionals, with some high-level provisions related to the roles of Safety and Health Specialists, and Safety and Health Officials. More research at state level is needed (only two states were covered by the research.
Viet Nam	The regulatory regime in Viet Nam is highly prescriptive toward OSH professionals *(Government Decree No. 39/ND-CP,* as of 15 May 2016). Necessary OSH experience, role-specific tasks and functions, and OSH-specific education and CPD are all legislated to some extent.

Table 2. Legislated requirements for OSH professionals, by country

Country	Are education or experience requirements specified?	Are specific tasks described?	Are legal duties and obligations specified?	Are there certification or professional registration requirements?
Australia√	N	N	N	N
Canada	N	N	N	N
France	Y	Y	N	Y
Indonesia	Y	Y	N	Y
Jamaica	N	N	N	N
Japan	Y	Y	N	N
New Zealand√	N	N	N	N
Republic of Korea	Y	Y	N	N
Singapore	Y	Y	Y	Y
Spain	Y	Y	Y	N
Thailand	Y	Y	N	Y
United Kingdom√	N	N	N	N
United States	Y*	Y	N	N
Viet Nam	Y	Y	YY	

Note: √ – general duties relating to competent workers but not specific to OSH professionals;
* – legislated requirements only apply to a subset of employers (federal agencies).

As expected, and based on the differences in soft and hard legislative approaches, countries with principle-based approaches were similar in their regulation of OSH professions. For example, Australia, Canada, New Zealand, and the United Kingdom are similarly non-specific in their references to OSH professionals. Nevertheless, within this cluster of countries there are some variations. For instance, Australian state-based legislation (e.g., Victoria and Western Australia) and that in the United Kingdom have a few prescriptive aspects relating to employers engaging competent OSH advice. Although the obligation is squarely on the employer (or person/s operating a workplace), in these instances, such legislation serves a purpose of guiding OSH professionals to engage in adequate training and education, and ensures they are competent so as to be a more attractive candidate for employers. In Canada, the *Occupational Health and Safety Regulations* (1986) refer to the employer ensuring that a "suitably qualified person" is engaged for inspection and verification of the safety integrity of various physical structures, equipment and work activities. These only apply to federally regulated work and undertakings.

In Australia, there are goal-based, harmonized or "model" laws regarding OSH. These overarching articles of legislation and regulation provide a template which the regional states and territories then adopt, either in full or with minor modifications. Nevertheless, in Australia, as well as Europe, country-level and even provincial differences and nuances exist. For instance, whereas Australian model law contains no prescription or requirement regarding the OSH profession, the states of Victoria and Western Australia (which have not completely harmonized with the rest of the country) do include some specific provisions. In Victoria, the Occupational Health and Safety Act (2004) outlines this provision for OSH professionals (duties of employers):

Employ or engage persons who are suitably qualified in relation to occupational health and safety to provide advice to the employer concerning the health and safety of employees of the employer (Section 22, Subsection 2b).

Notably, the legislation makes no specification regarding the nature of "suitably qualified" nor the type or nature of advice that should be provided, but typically it means that OSH professionals have qualifications that are sufficient and appropriate to provide advice on OSH in the specific workplace and/or industry context. This provision allows flexibility for professional associations to help determine what constitutes qualifications and experience, erect barriers to the profession, and generally enhance the capability of OSH professionals by ensuring training and development remains contemporary and relevant.

In Queensland, another Australian state, there is no mandatory requirement for employers to hire or engage an OSH professional, but there is a provision whereby engaging someone with responsibility for OSH shows evidence that the employer has taken action to mitigate health and safety risks. According to the Work Health and Safety Act in Queensland (Australia, Queensland 2011):

A person conducting a business or undertaking may appoint, as a work health and safety officer for that business or undertaking, a person who holds a certificate of authority for appointment as a work health and safety officer. (Part 5A, Section 103A).

Appointment of a work health and safety officer (WHSO) under Queensland law is confirmed as admissible evidence that the duty holder (employer or person conducting a business or undertaking (PCBU)) has taken action to mitigate health and safety risks. A Queensland information guide on WHSOs states "the appointment of a WHSO is permissible as evidence that a PCBU has taken action to mitigate health and safety risks" (Australia. Queensland Government 2018).

Indeed, legislation regarding the appointment of a WHSO in Queensland, although not mandatory, includes several points regarding functions and duties, how frequently various OSH activities should be undertaken (e.g., risk assessments and committee meetings), and immunity from prosecution in the performance of duties required by the Act.

Although the United States (at federal level) corresponds roughly to the principle-based approaches of Australia, Canada, New Zealand and the United Kingdom, there are some provisions relating to federally regulated institutions and enterprises. Moderate levels of prescription exist for the OSH professionals engaged by these institutions and enterprises (e.g., high-level tasks, duties, and responsibilities). OSH capability and effectiveness may be driven in this country through the prescription offered by various standards and technical codes/guidelines that often become enshrined in regulations. Thus, OSH professionals (although not technically required under federal law in the United States) may be indirectly sought and engaged by employers through the technical requirements of these standards. OSH professionals may also find themselves engaging in more training and development as a result of the dominance of technical requirements and standards.

On the other end of the legislative spectrum, countries such as Japan, the Republic of Korea, Thailand and Viet Nam have highly prescriptive requirements for OSH professionals. In these countries (which tend to be in South-East Asia), multiple OSH professional roles are defined, each with nuanced and specific legislated functions, tasks, and education/training requirements. This approach means that a high degree of centralized control can be exerted over OSH capability and effectiveness but requires continual legislative review and update as the state of OSH science evolves.
Given the rapid evolution of safety culture over the past decade (Dekker 2019), South-East Asian countries with highly prescriptive approaches may experience challenges in keeping their legislation contemporary and aligned with the latest science.

One South-East Asian country stands out as different – Singapore. Singapore balances prescription with flexibility, which may be a result of its colonial background and the influence of the United Kingdom, combined with national culture and regional characteristics such as preferences for top-down control and hierarchy (Hofstede Insights 2022). Specific roles are prescribed, along with general requirements regarding training and professional development, but how these roles are implemented in organizations remains flexible and there is some latitude for organizations to contextualize the OSH professional's role as required. The OSH professional has direct education and experience requirements, and an extensive list of tasks that must be performed. Interestingly, these tasks as described in Article 10 of the *Singapore Workplace Safety and Health Regulations* (2007) are sufficiently general that they cover a range of practice domains (e.g., inspection, documentation and record keeping, risk assessment, investigation of accidents, dangerous occurrences and occupational disease). So, although the provisions are specific in the need to employ one or more OSH professionals for high-risk contexts, employers (and OSH professionals) are given a degree of flexibility in how these duties are executed. This combination of legislative looseness and tightness means that a standard of OSH practice is established (e.g., requirements to engage in continuous education, and minimum standards of qualification for certain roles). However, the organizationally specific tasks and duties, as well as the various technical specialities of each OSH professional role, can be adapted and modified to suit the organization/industry context. A general approach to tasks and functions may facilitate future-proofing of legislation and regulations, as the role evolves, and if the legislation is sufficiently broad to allow for continued relevance and applicability.

Finally, European countries such as France and Spain have different approaches (compared to Commonwealth countries) to regulating OSH professionals. At a macro/cross-national level, the European Union's *Framework Directive on OSH 89/391/EEC* (EU-OSHA 2021) introduced members in 1989 to general goal-based legislation regarding the engagement of protective and prevention services (which is synonymous with OSH services). The EU Directive is part of a broader framework strategy that includes prevention of harm within the model. Regarding OSH professionals specifically, the EU Directive requires employers to appoint one or more workers to carry out activities related to protection and prevention of occupational risks (Article 7, 1), or if there is a lack of competent personnel, engage competent external services or persons (Article 7, 3). The Directive focuses on competency and capability, through specifying that designated workers and external services must have the necessary capabilities and means to carry out their work (Articles 5,7). Requirements in the EU Directive are legally binding for Member States, but the execution thereof (in the form of local laws and mechanisms) is left to each country to design, implement, and enforce. Consequently, there is some variation in the implementation of this Directive across EU Member States.

French legislation includes moderate to general prescriptions regarding a competent person that employers must engage to assist with OSH duties. There is provision for companies without internal requisite skills or resources to engage an IPRP belonging to the company's occupational health service or who is independent (external) and who may be considered a "consultant" or "advisor" in other Western countries. Therefore, French legislation not only covers the internal OSH professional who may be employed by an organization but also those externally contracted for specific activities. Spain has a similar approach, except that requirements for employers to hire OSH professionals vary depending on the size of the enterprise and types of risks involved in the undertaking. Compared to France, legislation in Spain is also more prescriptive in duties, tasks, and education requirements bearing some similarities to the South-East Asian countries reviewed insofar as a specific OSH role, with varying capability levels, is articulated in legislation.

Also similar to Spain, most of the South-East Asian countries reviewed had requirements on employers to hire OSH professionals. This varies depending on criteria like enterprise size (workforce size) and, in some cases, the type of industry and level of risk. For instance, below a certain number of workers in the workplace, OSH professionals may not have to be appointed. This is the case in: i) Indonesia in enterprises with under 100 workers (except for enterprises "using materials, processes, and/or tools that are deemed high risk under Indonesian law"); ii) Japan (under 10 workers); iii) the Republic of Korea (under 20 workers); and iv) Spain for enterprises with under 10 workers (except if the enterprise performs dangerous work). In Japan, the Republic of Korea, Spain, Thailand and Viet Nam, the roles and functions of appointed OSH professionals also vary depending on the workforce size, industry/sector and/or level of occupational risks. In Thailand, for example, all types and sizes of businesses covered by the *Occupational Safety, Health and Environment Act* (2011) must appoint a "Safety Officer" at a "management level" and a "Safety Officer" at a "supervising level". In high-risk businesses, including in manufacturing, construction/demolition, transportation, and gas stations, the following categories of professionals must be appointed: a Safety Officer with a "technical level" in enterprises with 20–49 workers, a Safety Officer with an "advanced technical level" in enterprises with 50–99 workers and a Safety Officer with a "professional level" in enterprises with 100 or more employees (see Section 3.3 for more details on these roles and functions).

More research on regulation is needed to identify industry-specific requirements.

3.2 Professional Associations

In many Western countries with principle-based OSH legislation, for example Australia, New Zealand and the United Kingdom, regulation of the profession is achieved informally by professional associations through membership and certification requirements (e.g., mandatory professional development and minimum qualification levels). Professional associations in these countries tend to focus on non-mandatory professional development events (e.g., webinars, face-to-face training, coaching and mentoring, conferences) aimed at contributing towards both members' and non-members' ongoing professional development. Certification involves evaluation of OSH professional qualifications and/or experience and providing them with a corresponding title matching their level of competence. In the absence of specific legislation regarding competence, certification provides employers and clients (in the case of consultants) with reassurance that a professional's advice and services are sound. Also, the focus on training and certification is potentially more pronounced in Western free market economies as OSH professionals may experience greater pressure to differentiate themselves and be a competitive candidate for job postings.

Globally, the Institution for Occupational Safety and Health (IOSH) is the world's largest professional association for OSH workers. With over 48,000 members across 130 countries, IOSH provides a range of services that focuses mainly on education and training, ensuring competence and ongoing professional development. In line with other leading professional associations, IOSH has recognized the shift away from an exclusively technical and compliance-oriented training and education approach and has expanded its offerings and frameworks into the area of interpersonal competencies. Like many other professional associations, IOSH requires its members to undertake mandatory professional development courses each year (facilitated by a points system), and it randomly audits members to ensure compliance. Another IOSH priority is to create globally competent and capable professionals that possess well-rounded skills which are internationally recognized and transportable. Raising the international profile of OSH includes collaboration with governments, major corporations, and even competitor associations. There is a particular focus on driving industry awareness of the value of employing OSH professionals. Campaigns are regularly developed and conducted (i.e., connecting the OSH profession to broader movements such as corporate social responsibility), as well as research projects and outputs like white papers.

The European Network of Safety and Health Professional Organizations (ENSHPO) is another example of a major association that offers professional certification services. The organization has created two standards for certification: the Occupational Safety and Health Manager (EurOSHM) and the Occupational Safety and Health Technician (EurOSHT). ENSHPO has also developed a Code of Conduct for certified members that includes 11 points, ranging from a respect for data and evidence, through to avoiding conflicts of interest and reporting professional misconduct of OSH colleagues.

The Australian Institute of Health and Safety (AIHS) has contributed to the global profession through the establishment of an OSH Body of Knowledge (BoK). Currently consisting of approximately 50 chapters in various stages of completion, either planned, under way or completed. The intended purpose of the BoK is to: i) support OSH professionals to build a shared understanding of the causation and control of work-related incidents; ii) facilitate informed problem-solving and discussions; and iii) improve OSH professional practice. An important function of the BoK is that it informs the education accreditation and certification processes, as well as contribute to CPD activities conducted by the AIHS.

In countries such as the United States and Canada, professional associations adopt a more technical role by contributing actively towards, and in some cases, specific technical standards that become widely accepted by industry. For example, the American Society of Safety Professionals (ASSP) has developed a suite of standards across topics such as management systems, construction, and fall prevention, among many more topic areas. The Board of Certified

Safety Professionals (BCSP) offers eight different certifications ranging from generalist OSH professionals (e.g., Certified Safety Professional®) through to industry-specific titles such as Construction Health and Safety Technician®. Certification is presented to OSH professionals as an opportunity to advance their careers, increase their salary, and improve the standard of OSH in their workplace. The BCSP focuses on mentoring, career planning, and annual "learning summits" where OSH professionals can gain access to virtual education resources at low cost. Notably, the Vietnamese Occupational Safety and Health Administration (VOSHA) adopts a similar certification system and emphasis, with five registered titles on offer. VOSHA also offers training and education programmes both to its members (certified and non-certified) and the general OSH workforce.

In New Zealand, the absence of formal requirements for OSH professionals has anecdotally created some historical concerns regarding competence and effectiveness of OSH advice provided to employers. The New Zealand Government established the Health and Safety Association (HASANZ) to function as an umbrella organization that various professional associations can apply to join. It was formed as part of the Government's response to the Pike River mine explosion inquiry (New Zealand 2012). HASANZ aims to raise practice standards by establishing a voluntary professional register (for OSH and related disciplines such as ergonomics and occupational therapists). It conducts professional development and education events, sponsors and promotes profession-related research, and generally raises the profile of the OSH profession. According to interviewees, strong collaboration between the Government, HASANZ, and professional associations is key to its success at regulating the profession.

The Singapore Institution of Safety Officers (SISO) provides a range of training courses that is required for safety professionals and ongoing professional development opportunities. Safety associations in Singapore may apply to the central government for accreditation as a training provider. Notably, SISO regularly consults with the OSH profession to identify training and professional development needs, with the last round completed in late 2021. SISO does not offer a certification programme, but a membership programme is offered with two categories, professional and associate. Professional members of SISO must be legally registered as a WSHO with the Ministry of Manpower in Singapore (SISO 2022).

3.3 Job titles, tasks and duties

The job titles, tasks and duties of an OSH professional are diverse across the 14 countries reviewed. In some countries, there is no specific mention of an OSH professional in legislation (e.g., Australia, Canada, Jamaica, New Zealand and the United Kingdom), which means there is a large array of possible manifestations of the OSH professional. Other countries are prescriptive. Some focus on one primary job title, for instance, Work Safety & Health Officer (Singapore), Occupational Safety and health officer (Viet Nam), and Occupational Safety and Health Expert (Indonesia), while others include multiple job titles (e.g., Japan and the Republic of Korea).

Job titles

OSH professionals adopt a range of job titles, which seems to depend on the level of qualification and experience held by the individual, and which is largely driven by industry. Table 3 summarizes a list of example OSH professional job titles derived from Safesearch, a leading OSH recruitment company in Australia. Notably, there is equally as much variation in OSH professional job titles in legislatively prescriptive countries (e.g., Singapore, Thailand, and Viet Nam) as there is in industry-driven countries (e.g., Australia, New Zealand and the United Kingdom).

Table 3. Examples of OSH professional job titles

Example OSH job titles
▶ Safety systems manager ▶ Health, safety and environment (HSE) business partner ▶ Senior HSE advisor ▶ Return to work coordinator ▶ Junior work health and safety coordinator ▶ HSE officer ▶ HSE advisor ▶ Quality, health, safety, security, and environment coordinator ▶ Health and safety engineer

Source: Safesearch, Australia, available at: Safesearch.com.au.

Thailand has just one job title specified by legislation (Safety Officer), and it is divided into five different levels that reflect increasing role sophistication and complexity (i.e., from technical execution of OSH activities up to managerial duties and strategy development); specifically, supervising, technical, advanced technical, professional, and management levels *(Ministerial Regulation on the Prescribing of Standard for Administration and Management of Occupational, Safety, Health and Environment B.E.2549,* 16 May 2006). Thailand is somewhat like the system in Spain whereby the legislated title of OSH Technician is divided into three levels of functions: basic, intermediate, and advanced *(Preventative Services Royal Decree* 39/1997).

Tasks and duties

In most countries where tasks and duties of OSH professionals are not legislated, there is significant variation that is driven by professional associations, industry, and individual employers/organizations. Following the work of Provan and fellow authors (2020), traditional OSH-related tasks can be summarized into eight general categories. In organizations with progressive OSH systems and practices (e.g., resilience engineering), eight general categories of tasks and duties emerged (as shown in Table 4).

Table 4. Summary of traditional and contemporary OSH tasks and duties

Traditional OSH management tasks/ duties (centralized control)	**Contemporary** OSH management tasks/duties (guided adaptability)
1. Identify task hazards and assess risk	1. Explore differences between planned and executed work
2. Identify system hazards and assess risk	2. Update the organization's risk models
3. Develop controls	3. Support local work and help teams to balance competing priorities
4. Monitor and verify controls	4. Negotiate the allocation of resources;
5. Develop reports and information	5. Encourage information to flow between and within teams
6. Support decision-making at the frontline	6. Monitor and anticipate threats to safety
7. Promote workers to stop if conditions are unsafe	7. Assist workers to make considered trade-off decisions
8. Develop and implement safety culture programmes	8. Facilitate learning

Source: Provan et al. 2020.

Other sources provide insights into the tasks and duties of OSH professionals. For instance, the HASANZ (2021) *Health and Safety Generalist Pathway* resources outline example tasks and duties for four key levels of OSH professional performance: entry-level, advisory, senior, and leader as summarized below in Table 5.

Table 5. OSH professional tasks and duties, by level

Entry-level	Advisory
▶ Provide initial OSH advice and support to workers ▶ Contribute to problem-solving activities ▶ Provide coaching and mentoring ▶ Create and deliver basic OSH training	▶ Provide initial OSH advice and support to workers ▶ Advise on use of OSH tools and processes ▶ Provide coaching and mentoring ▶ Contribute to problem-solving activities ▶ Create and deliver OSH training ▶ Develop OSH reports and analyses
Senior	**Leader**
▶ Provide expertise to management as needed ▶ Lead complex OSH projects (e.g., culture change, critical risk management) ▶ Manage a team of OSH professionals ▶ Preparing and presenting OSH data to management	▶ Engage in and advise on strategic thinking ▶ Show business acumen ▶ Contribute to informed business decision-making about OSH ▶ Influence and persuade others, particularly on OSH matters

Source: HASANZ 2021.

Countries with more prescriptive OSH legislation specify tasks and duties in detail. For instance, Viet Nam includes nine different general tasks and duties for which OSH professionals are responsible. These tasks map on generally to the "traditional" OSH role as outlined by Provan et al. (2020). For instance, legal provisions in Viet Nam *(Law of Occupational Safety and Health*, 2015, Article 72) require OSH professionals to:

- develop regulations, procedures and other measures to ensure occupational safety and health in the workplace;
- develop and monitor annual plans on OSH, manage and monitor inspections;
- organize information, communication and training activities on OSH;
- organize and conduct investigations;
- organize emulation, commendations and rewards;
- organize and apply, where appropriate, disciplinary procedures; and
- perform statistical work and reporting on OSH.

Japan is similarly prescriptive in legislated OSH duties and tasks, which are divided into two broad categories based on workplace size: *Officers* for enterprises with 50+ workers, and *Advocators* for between 10–49 workers. The former includes a broader suite of tasks and duties, reflecting the more advanced nature of this OSH role based on workplace size. The latter is less exhaustive, based on the needs of smaller workplaces and includes tasks such as conducting inspections, health surveillance, education, first aid supply, investigation of occupational accidents and reporting to administrative agencies *(Ministry of Labour Notification No. 602*, 16 September 1988).

The Republic of Korea's *OSH Act* also includes two types of OSH professionals depending on workplace size: *Safety and Health Officer* for 50+ workers in the organization, and *Safety and Health Staff* for between 20–49 workers. The *Safety and Health Officer* is in charge of broader and in-depth tasks and duties, whereas *Safety and Health Staff* are in charge of a few technical matters related to OSH in small workplaces (Article 18(1), 22(1), and 25 of the *Enforcement Decree of the Occupational Safety and Health Act,* as amended on 19 November 2021).

Spain bears some similarities to Japan in that OSH legislation requirements vary depending on workplace size, and also to Thailand as tasks and duties vary based on the level of complexity and sophistication involved in each OSH role. However, whereas in Japan specific roles are assigned to different workplaces based on size, Spain instead has just one role (the OSH professional), and the employer has various options depending on the number of workers in the organization *(Regulation regarding Prevention Services, Royal Decree No. 39*, 1997). For example, in small businesses of 1–10 workers, the employer can perform OSH activities (except for specifically defined "dangerous" work). In large workplaces of 500 and more workers, an internal OSH service must be established which would consist of multiple OSH professionals with varying specialities based on the needs of the workplace. The tasks and duties of OSH professionals in Spain vary according to the level of OSH function: basic, intermediate, and advanced. Exceptionally high prescription is outlined for each level, with basic corresponding to an "entry level" OSH professional responsible for facilitating basic prevention activities such as cleanliness, action in emergencies and first aid scenarios, and basic risk assessments. The "intermediate level" corresponds to a technical OSH expert who is responsible for advanced risk assessments, participation in planning of prevention activities and carrying out training. The "advanced level" corresponds to a lead or senior OSH professional who handles risk assessments requiring advanced monitoring and outcome measurement, as well as delivering specialized training.

France is somewhat moderate in its prescription of tasks and duties for OSH professionals. The employer is the primary duty holder regarding occupational risk management and prevention, and is fully liable and responsible for achieving OSH results. The regulation provides employers and OSH professionals with flexibility in how they deploy their skills and responsibilities in organizations. For instance, the "competent OSH employee" has one broadly defined set of tasks: to assist employers in risk assessment, organizing prevention activities, and monitoring implementation *(Ministry of Labour Circular of 9 November* 2012). A methodological tool for employers was developed by the National Research and Safety Institute (INRS). The tool provides employers with a scheme to: identify who does what in the enterprise; ii) identify necessary competences; iii) determine training needs; and iv) define OSH functions (INRS 2012). At regional level, an additional tool was developed in collaboration with various institutional actors (France 2018) and provides guidance on the role of the Competent Employee who may be responsible for:

- organizing training of new arrivals;
- monitoring enterprise OSH data;
- contributing to the analysis of accidents at work;
- drawing up prevention plans for work to be carried out by an externally contracted company; and
- ensuring that safety is taken into account when purchasing a new machine, etc.

A summary of the tasks and duties for identified positions in OSH legislation taken from the 14 reviewed countries is provided in Table 6.

Table 6. Tasks and duties for identified OSH professions, by country

Country	Legislated job title(s)	Summary of legislated tasks/duties
Australia	None	N/A
Canada	None	N/A
France	Competent Employee	As indicated in the *Labour Code* the "competent employee" is appointed to take charge of the occupational risk protection and prevention activities (Code du travail, Arts L. 4644-1 and R. 4644-1). The tasks of the competent employee, as described in the *Ministry of Labour's Circular of 9 November 2012,* include assisting employers to perform risk assessments, organizing and planning preventative actions and monitoring implementation. He or she may also participate in an advisory capacity in meetings of the OSH committee.
	Occupational Risk Prevention Practitioner (IPRP)	This varies depending on whether the IPRP is internal to the occupational health service (OHS) or independent. The internal IPRP carries out diagnostic, advisory, accompaniment and support missions, and communicates the results of these studies to the occupational physician. The independent IPRP called upon by the employer is intended to carry out the same mission as that of the "competent employee", where applicable, i.e., a mission to support the general assessment of risks and planning of preventive actions.
Indonesia	Occupational Safety and Health Expert (OSHE) (not required in workplaces under 100 workers, except in those "using materials, processes, and/ or tools that are deemed high risk under Indonesian law")	The OSHE supervises implementation of OSH law; provides regular reports to the employer and the government; manages risks appropriately; and delivers OSH education on a range of topics *(Ministry of Manpower Regulation No. 2*, Article 9, 1992).

Country	Legislated job title(s)	Summary of legislated tasks/duties
Jamaica	None	N/A
Japan	Safety Officer (SO) (required in workplaces with 50+ employees)	The SO manages technical safety matters, inspects workplaces and takes action on identified risks, ensures emergency preparedness and maintenance of safety equipment, provides safety education and training, investigates occupational accidents, supervises emergency response staff, and conducts OSH administration and recording of safety data *(Labour Standards Bureau Notification No. 601-1*, as of 18 September 1972).
	Health Officer (HO) (required in workplaces with 50+ employees)	The HO manages technical health matters, inspects workplaces and takes action on identified risks, detects persons with health problems, investigates work environment hygiene, inspects personal protective equipment, provides health education and consultation, record health data, and maintains job-related records *(Labour Standards Bureau Notification No. 601-1*, as of 18 September 1972).
	Safety and Health Advocator (SHA) (required in workplaces with 10–49 employees	The SHA conducts inspections and health surveillance; OSH education; supplies first aid in emergency situations; investigates occupational accidents; collects information on safety and health; and prepares and compiles statistics on occupational accidents, illnesses, and absences from work, and reports on safety and health to the administrative agencies *(Ministry of Labour Notification No. 602*, 16 September 1988).
New Zealand	None	N/A
Republic of Korea	Safety Officer (SO) (required in organizations with 50+ workers)	The SO handles duties of the OSH committee; assists guides, and advises the employer or supervisor on OSH matters; assists with procurement decisions; develops an OSH education plan and delivers training to staff; inspects and makes recommendations; investigates incidents; assists in risk prevention matters; supports the collection and analysis of OSH data; advises on OSH law; and prepares records or reports on OSH performance *(Enforcement Decree of the Occupational Safety and Health Act,* Article 18(1), as amended on 19 November 2021).

Country	Legislated job title(s)	Summary of legislated tasks/duties
Republic of Korea	Health Officer (HO) (required in organizations with 50+ workers)	Duties are the same as listed above for the SO, except specific to the domain of OSH only. Additional responsibilities are: managing safety data sheets for chemicals and substances; performing various medical practices such as applying first aid to injuries or emergency treatments as needed; and administration of required medicines *(Enforcement Decree of the Occupational Safety and Health Act*, Article 22(1), as amended on 19 November 2021).
	Safety and Health Staff (SHS) (required in workplaces with 20-49 workers)	SHS – For workplaces between 20-49 employees: assisting with OSH education; assisting on risk assessment; work environment measurement and improvement; health examinations and surveillance; investigating accidents; and assisting with procurement decisions *(Enforcement Decree of the Occupational Safety and Health Act*, Article 25, as amended on 19 November 2021).
Singapore	Workplace Safety and Health Officer (WSHO)	The WSHO identifies, assesses, controls and manages OSH risks; and develops, maintains and improves OSH management systems *(Workplace Safety and Health Regulations, (WSH Officers)*, Article 10, 2007).
	WSH Coordinator	These duties entail coordinating and monitoring the implementation of WSH management systems for recognition, assessment, control and management of WSH risks (*Workplace Safety and Health Regulations (Construction)*, Article 8, 2007).
Spain	Prevention Technician (various levels)	This is classified into three levels: basic, intermediate, and higher-level functions *(Royal Decree 39/1997*, Articles 34-37). The basic level concerns operational safety such as risk assessment, or emergency response. The *intermediate level* concerns OSH prevention and promotion activities such as education, risk assessment and monitoring compliance. *Higher-level* functions are concerned with occupational medicine, occupational safety, industrial hygiene, ergonomics, and applied psychology. These higher-level functions are focused on advanced risk assessment (where a measurement strategy is required), general OSH training delivery, and health monitoring and management.

Country	Legislated job title(s)	Summary of legislated tasks/duties
Thailand	Safety Officer (SO) (various levels, depending on workforce size and level of risks)	SO duties are classified into five levels: supervising, technical, advanced technical, professional, and managerial *(Ministerial Regulation on the Prescribing of Standard for Administration and Management of Occupational, Safety, Health and Environment*, 2006). 1. Supervising roles are operational (providing training in protective equipment usage, inspection); 2. Technical and 3. Advanced Technical levels are focused on tactical services such as diagnosis, investigation of incidents, analysis, and recommendations and/or advice to managers; 4. Professional level adds specific provisions for risk assessment and advice-giving; and 5. Managerial level is strategic and requires the development of an OSH plan or strategy, and oversight of other OSH professionals.
United Kingdom	None	N/A
United States	Safety and Health Specialist (SHS)	Not specified in federal legislation *(OSH Act,* 1970).
	Safety and Health Official (SHO)	Not specified in federal legislation *(OSH Act*, 1970).
	Safety and Health Inspector (SHI)	SHIs prepare for inspections, engage in inspections (including consultation with workers), and develop analysis and written reports for employers *(OSH Act*, 1970).
Viet Nam	Occupational Safety and Health Expert (OSHE) (requirements for appointment vary depending on both workforce size and type of industry)	An OSHE has varied and exhaustive tasks, consisting of nine specific tasks and duties *(Law of Occupational Safety and Health*, Article 72, 2015). These range from development of regulations, procedures and measures to maintain compliance, through to developing annual plans and reports. OSHE duties also include the investigation of occupational accidents and incidents, as well as coordinating with workers' representatives.

3.4 Competence/experience and education/ training

Competence and experience

At a global level, there have been some concerted efforts to establish guidelines regarding the competence and experience requirements of the OSH profession, in the form of global competency and/or capability frameworks. Notably, *competencies* refer to an OSH professional's current state – in terms of knowledge and skills possessed. Whereas *capability* refers to integrating knowledge and skills and adapting them as required to meet future needs.

One example of a capability model is the *Occupational Health and Safety Professional Capability Framework* compiled by INSHPO (2017a) following the landmark Singapore Accord.[6] The capability framework is a complex document that describes typical OSH role profiles, along with the corresponding knowledge and skills required by each role to be successful. Seven broad dimensions of successful performance apply to OSH practitioners and professionals, albeit in different ways, with practitioners requiring a less sophisticated level of capability than professionals.

An example of a competency model is the *Professional Standards for Safety and Health at Work* developed by IOSH (2019). Organized around three dimensions (core, technical, behavioural), and in turn, 12 domains of application (e.g., risk management, strategy, communication). This model also includes 69 different OSH professional competences. A key feature of this model is the inclusion of multiple behavioural competencies, such as influencing and managing stakeholders, managing personal performance, communicating, and working in collaborative situations. Including behavioural competencies that focus on non-technical or interpersonal skill sets reflects the broader changes associated with the OSH professional identity and future needs in terms of facilitating, influencing, and coaching/mentoring (Provan et al. 2020; Pryor et al. 2021).

The Singapore Government, via the *SkillsFuture Singapore*[7] initiative, offers a comprehensive suite of knowledge and skill requirements for five different OSH professional roles, varying based on sophistication and seniority. For instance, these roles range from a WSHO, through to a Workplace Safety and Health Manager. "Skills maps" are provided for each of these five roles, which outline the job role description, critical work functions and key tasks, and performance level requirements. Further, *SkillsFuture* offers a range of automatically generated tools and templates such as interview guides and performance appraisal checklists. Advice on emerging OSH skill requirements is also provided, such as big data analytics and network technology management.

Education and training

In countries with soft or less prescriptive OSH legislation, education and training is a thriving industry with a wide variety of options available. Such education and training ranges from informal training provided by private organisations (e.g., 'advanced OSH practice' courses and similar, which focus on non-technical skills such as leadership and knowledge of OSH science), to vocational courses provided by both public sector and private sector registered training

[6] This event was attended by policymakers, government regulators, industry, and many international OSH professional associations). For more details see the Singapore Accord on the Standards of OHS Professionals (INSHPO 2017b), available at: *https://www.inshpo.org/singapore-accord/singapore-accord.*

[7] For more information see the SkillsFuture website at: *https://www.skillsfuture.gov.sg/.*

organisations, and finally to undergraduate and postgraduate degrees offered through universities. Whereas OSH professional education and training requirements are not legislated, a variety of forces shape the safety and health culture and educational strategy. For instance, regulators, industry and employers, academics, consultants, and publishers all exert a force that determines what OSH professionals need to know and how they should execute their duties (Le Coze 2019). Quality control mechanisms vary but tend to include public audits and inspections on registered training organizations and registration schemes, specified curricula and education topics by international and national standards organizations and third-party auditing. An example is International Standardization Organization's *ISO 29990:2010* – *Learning services for non-formal education and training: Basic requirements for service providers*. In the case of Australia, there is also a dedicated OSH qualification accreditation board for universities that offer OSH courses and programmes.

A comparison of OSH educational qualifications from a selection of English-speaking countries (Australia, Canada, New Zealand and the United Kingdom) revealed that Australia and New Zealand seem to provide the most diverse array of OSH qualifications across vocational and higher education (university) sectors. This array of education and training options likely provides OSH professionals with expanded choices regarding their level of study, as well as future career progression opportunities through the pursuit of more advanced qualifications. Australia's structured education system means vocational courses are standardized according to national competency frameworks, potentially leading to greater consistency in design and delivery quality. At the university level, the national OSH accreditation board provides assurance regarding the design of advanced programmes of study.

Governments in North America play a more active role in OSH professional education and training, in addition to a wide range of privately offered options available through professional associations and consultant organizations. In Canada, the Canadian Centre for Occupational Health and Safety (CCOHS) provides a comprehensive suite of educational programmes for OSH professionals. This includes: risk assessment, accident investigation, emergency response, ergonomics, health and safety committees, health and wellness, procedures such as lock-out/tag-out, violence prevention, and workplace inspections. In the United States, the Occupational Safety and Health Administration (OSHA) manages a network of not-for-profit partner organizations (OSHA Training Institute Education Centres) that offer different options which are mainly technical, and covering topics such as chemical handling, construction works, lock-out/tag-out, etc.). An OSH Training Centre can be a small community training provider or a large academic institution, such as the Agricultural and Mechanical College of Texas (Texas A&M University). There are also university-level programmes providing certification to doctoral studies.

In France, as reported by interviewees, the training possibilities for the "Competent Employee" and the IPRP are very broad, and a wide variety of training organizations exist. This includes training and education provided by OSH institutions, workers' organizations and universities, etc. Training organizations are overseen by a specialized service within the Ministry of Labour, which mainly focuses surveillance on material resources. In practice, important differences are reported between competences of the "Competent Employees" in small as compared to large enterprises, small enterprises relying mostly on their occupational health services for activities related to OSH management. Additionally, with no mandatory training for the "Competent Employee", varying degrees of competence are reported to be found in enterprises. The independent IPRP on the other hand must have: i) an engineering degree; ii) higher education in either OSH, work organization, another scientific field or in a work-related human and/or social science subject; or iii) at least five years of professional experience in the field of occupational risk prevention. Independent IPRPs may have various profiles and skills for carrying out contracted functions, e.g., ergonomics, toxicology, psychology, industrial hygiene, work organization, etc.

In countries with higher levels of OSH prescription, regulation can be inconsistent in enforcing OSH education, training and quality levels. For instance, in Japan, a system of national exams and prescribed (basic) training programmes is delivered by approved providers. The national exam only applies to Health Officers, and not Safety Officers or Safety Advocators *(Ordinance on Industrial Safety and Health,* 1972). According to interviews conducted as part of this research, Japan's prescribed training programmes are considered to be "entry-level" and inadequate to meet OSH professional demands for the more advanced knowledge and skills that jobs demand in practice. However, for Health Officers, the University of Occupational and Environmental Health (UOEH) offers a comprehensive university curriculum on OSH management systems. Graduates are qualified as first-class Health Officers and can easily be hired directly by enterprises.

In Viet Nam, there is very little prescription or requirements regarding initial education of Occupational Safety and Health Officers (OSHOs). In fact, no initial training is required for the appointment of OSHOs, however, they must have significant work experience in technical (related) jobs and/or a college or university degree *(Government Decree No. 39/ND-CP*, Article 36, 15 May 2016). Interestingly, the ongoing professional development requirements for OSHEs in Viet Nam are exceptionally prescriptive, with hours of training and specific topics outlined *(Government Decree No. 44/2016/ND-CP*, 16 June 2016). According to interviewees, a similar consistency and quality issue surrounding education and training of OSH professionals exists in Viet Nam.

In the Republic of Korea, there are specific regulations on initial education for OSH professionals (timing, hours, and curricula content). For instance, a Safety Officer shall undergo ≥34 hours of initial education on the OSH Act, education methods on OSH, safety inspection, evaluation, etc. within the first three months of employment as a Safety Officer *(Ordinance of the Occupational Safety and Health Standards,* Article 29, as amended on 19 November 2021).

Table 7 briefly summarizes the education and training landscape for each reviewed country.

Table 7. Education and training landscape, by country

Country	Summary
Australia	There is a combination of vocational and formal tertiary education provided by both public and private organizations. Vocational training is regulated nationally. Australia is the only reviewed country to have a dedicated OSH qualification accreditation body for university-level courses.
Canada	The Canadian Centre for Occupational Health and Safety was set up to support and facilitate the training of personnel in and for the field of OSH, among other activities and powers (Canadian Centre for *Occupational Health and Safety Act, R.S.C.*, 1985, c. C-13). Canada offers both vocational and academic programmes. Vocationally, technical colleges offer certificate- and diploma-level courses in OSH. Universities offer graduate diplomas and may also offer OSH courses as part of technical non-OSH degrees like engineering, construction management and industrial relations.

Country	Summary
France	Employers must provide the "competent employee" with appropriate training and education at their request (the training is the same as for OSH committee members *(Code du Travail*, Art. L4644-1, 2022). The independent IPRP must provide proof that the applicant holds an engineering degree; a degree attesting to at least two years of higher education in OSH or work organization; a degree attesting to at least three years of higher education in a scientific field or in a work-related human/social science subject; or at least five years of professional experience in the field of occupational risk prevention.
Indonesia	Training for an OSH expert can be delivered by formal education institutions, any private institution recognized by the Ministry of Manpower as an OSH training institution, or directly by a District Manpower Office. OSH training curriculum is legislated *(Ministry of Manpower Regulation No. 239*, 2003).
Jamaica	Both vocational colleges and universities provide OSH education and training.
Japan	There are prescriptive legislated requirements regarding training curricula for all OSH professional roles. Education is provided by mainly government organizations, but private organizations may also deliver such training courses *(Ordinance on Industrial Safety and Health*, 1972).
New Zealand	Education is provided by undergraduate and postgraduate university programmes, technical institutes, professional associations and other private training providers. There are several tertiary qualifications available in general health and safety. Professional mentoring is currently a major focus of the Government's OSH Regulator, *WorkSafe*.
Republic of Korea	Public and private institutions offer OSH education and training. These institutions must be registered with the Government *(Ordinance of the Occupational Safety and Health Act*, as amended on 19 November 2021).
Singapore	Public and private training providers deliver both vocational and university-level OSH courses, which the Ministry of Manpower reviews and approves *(Workplace Safety and Health Regulations,* 2007). Significant collaboration between SkillsFuture Singapore (SSG), Workforce Singapore (WSG), and the Workplace Safety and Health Council (WSHC), in conjunction with industry associations, training providers and workers' organizations, resulted in a highly comprehensive "Skills Framework for Workplace Safety and Health". The Framework offers networking options for lifelong learning, mentoring, upskilling, and training on emerging OSH skills.

Country	Summary
Spain	Employers are required to provide OSH professionals with suitable training internally or contract out to a suitable external service. *OSH Act,* Article 37,1995 requires that higher level functions of the OSH Technician must be delivered by a university institution. Overall quality of Spanish OSH-related training and education is regulated by the National Agency for the Quality of Education (ANECA). Regional education quality authorities support the activities of ANECA.
Thailand	People who hold a bachelor's degree in OSH or equivalent are permitted to become a Safety Officer at professional level *(Ministerial Regulation on the Prescribing of Standards for Administration and Management of Occupational, Safety, Health and Environment,* 2006). Such Officers are graduates from universities that have appropriate programmes. Other OSH professionals are trained by OSH-specific accreditation organizations, primarily the Safety and Health at Work Promotion Association, Thailand.
United Kingdom	A complex range of OSH education and training options are available, ranging from public and private institutions, inclusive of both vocational and university-level degrees. Professional associations such as IOSH and dedicated training organizations like the National Examination Board in Occupational Safety and Health are popular choices for OSH professionals.
United States	OSHA, the national regulator, professional associations and universities all provide a range of education and training programmes directly to OSH professionals. These programmes differ significantly, according to interviewees.
Viet Nam	OSH regulations in Viet Nam stipulate in detail the topics of OSH training and required training hours, but these only relate to ongoing professional development *(Government Decree No. 44/2016/ND-CP*, Articles 18, 19, 20, as of 16 June 2016). Both public and private OSH training organizations must adhere to strict prescriptions regarding instructor qualifications, facilities, and quality of training equipment.

3.5 Continuing professional development (CPD)

In many countries, there are no mandatory requirements for CPD outside what is required to maintain memberships and/or certifications with professional bodies. These bodies typically specify a minimum number of "points" that must be achieved to maintain status. Different professional development activities constitute different points, and generally, more in-depth events such as conferences convey more points than smaller events such as online training and webinars. Some professional associations, such as the AIHS, randomly audit members' professional development logs to ensure consistency and accuracy. Table 8 shows a comparison of three major OSH professional associations and their CPD requirements (in English-speaking countries).

Table 8. CPD requirements offered by selected professional associations

Professional Association	CPD requirements
Institution of Occupational Safety and Health (IOSH) International/UK	Most membership categories are required to complete CPD except for affiliate and associate members. An online log provides IOSH members the option to record their activities. CPD should align with identified developmental goals, skills and/or capability gaps. A minimum of six activities must be completed each calendar year to maintain membership.
Australian Institute of Health and Safety (AIHS) Australia	Certified members must engage in CPD each year, with 100 points being the minimum level of achievement. A CPD guide provides information on the various number of points per activity, arranged across education, service, workplace and practice.
Board of Certified Safety Professionals (BCSP) United States	Following initial certification, OSH professionals wishing to maintain certification must develop and execute CPD activities across five-year cycles. Associate or certified safety professionals and safety management specialists must complete 25 recertification points every five years. Hygiene safety or construction safety technicians and trainers need to complete 20 recertification points. There are 10 CPD categories and each category has a maximum limit on the number of points that can be claimed every five years.

As Table 9 demonstrates, only the Republic of Korea, Singapore, and Viet Nam have clear requirements for CPD. All legislated OSH roles in the Republic of Korea (i.e., Safety Officer, Health Officer, and Safety and Health Staff) must complete mandatory CPD, but the requirements are role dependent.[8] For instance, Safety Officers and Health Officers must complete a minimum of 24 hours of CPD every two years following their initial education, whereas the Safety and Health Staff must complete eight hours of CPD. Broad curricula for both roles are articulated, including for risk assessment, OSH laws and policies and workplace safety improvement. CPD is provided by the Korean Government.

[8] See Article 29(2) of the Ordinance of the Occupational Safety and Health Act, as amended on 19 November 2021 (Government of the Republic of Korea).

Singapore has a sophisticated CPD that is similar to the professional association approaches in English-speaking countries reviewed (i.e., Australia, the United Kingdom, the United States). Specifically, Skill Development Units (SDUs) are required every two years if a Singaporean-registered OSH professional (WSHO) wishes to remain certified. A minimum of 40 SDUs must be undertaken by WSHOs every two years, and evidence of this training and development (categorized into structured and unstructured activities) must be provided. An online portal has been set up on the Ministry of Manpower website to facilitate CPD and recertification. In Viet Nam, the CPD for Occupational Safety and Health Officers' is specified by the Government by *Decree No. 44/2016/ND-CP*, 16 June 2016. This must include 40 hours of training and eight hours of practice. An examination is done at the conclusion of this CPD to ensure competence. This CPD programme must be completed every two years (or where there are major changes at the workplace or a significant leave of absence), with roughly 50 per cent of the original training content being repeated each cycle. CPD training topics include OSH legal frameworks, basic technical knowledge and skills, as well as other specialized training topics.

Table 9. Continuing professional development (CPD) requirements, by country

Country	CPD required by law	Summary of CPD Requirements
Australia	N	CPD is required to maintain membership of professional associations
Canada	N	CPD is required to maintain membership of professional associations
France	Partially	There is an option for the *competent OSH employee" to engage in continuous professional development every four years *(Code du Travail*, Arts L4644-1, L2315-17, 2022).
Indonesia	N	Currently no formal capability or requirement for OSH professionals to engage in CPD.
Jamaica	N	Currently no formal capability or requirement for OSH professionals to engage in CPD.
Japan	Partially	Safety Officer are required to receive CPD every five years. Recommendations for competency improvement courses are given. (Guideline for competency improvement training in occupational accident prevention, as of 22 May 1989; *Labour Standards Bureau Notification No.0331023* of 31 March 2006).
New Zealand	N	CPD is required to maintain membership of professional associations
Republic of Korea	Y	The duty to ensure employed OSH professionals engage in CPD rests with the employer (Article 29(2) of the *Ordinance of the Occupational Safety and Health* Act, as amended on 19 November 2021).

Country	CPD required by law	Summary of CPD Requirements
Singapore	Y	The WSH Officer must demonstrate certain CPD requirements have been fulfilled directly to the government *(Workplace Safety and Health (WSHO Regulations)*, Article 4, 2007).
Spain	Partially	There are no specific legislative requirements but a general requirement exists for employers to ensure all workers receive adequate OSH training *(OSH Law 31/1995, Article* 19). Professional OSH associations require CPD to maintain membership.
Thailand	Partially	Employers must maintain additional OSH training for all workers, but this provision has not yet been implemented *(Ministerial Regulation on the Prescribing of Standard for Administration and Management of Occupational, Safety, Health and Environment*, Clause 22, 2006). Voluntary CPD is provided by professional associations.
United Kingdom	N	CPD is required to maintain membership of professional associations
United States	N	CPD is required to membership of professional associations
Viet Nam	Y	Occupational Safety and Health Officers are required to receive competency improvement training approximately every two years, when major changes at work occur, or when an OSHO leaves work for six months or more *(Government Decree No. 44/2016/ND-CP*, 2016).

3.6 Certification and registration

Only a handful of reviewed countries require OSH professionals to be certified and/or registered by law (France, Indonesia, Japan, Singapore, Thailand and Viet Nam). Certification is generally a system designed to verify and validate competence through a structured assessment process. Registration is keeping an ongoing record of who is practicing in the profession. In most countries reviewed, certification is optional and voluntary for OSH professionals, and primarily used as a mechanism to improve competitiveness in employment contexts.

Singapore is different in that it has a government-managed mandatory registration and certification system for OSH professionals. WSH Officers, once their application has been submitted, will have their qualifications assessed and if deemed acceptable, will receive a certificate of approval *(Workplace Safety and Health (Workplace Safety and Health Officers)* Regulations, Article 4, 2007). Further, they will be added to a public register of OSH professionals, available on the Ministry of Manpower website. Countries such as Australia do not have a mandatory national register for OSH professionals, but in jurisdictions like Queensland, there is a voluntary registration scheme managed by Workplace Health and Safety, Queensland. New Zealand also has a voluntary register maintained by HASANZ. As an umbrella organization representing workplace health and safety professions, it provides an online register of professionals, as well as searchable data.

In France, the independent IPRP must be duly registered with the competent regional administrative authority *(Directions régionales de l'économie, de l'emploi, du travail et des solidarités* (DREETS)). The registration file should contain proof that the applicant holds the appropriate diplomas or experience mentioned above; a declaration of interest; and an activity report from the last five years of practice in the case of renewal of the registration *(Code du Travail*, Article D4644-6). The registration is renewed after a period of five years (Code du Travail, Article D4644-8). The DREETS may terminate the registration of an IPRP at any time if the worker does not have the necessary competences, does not comply with the legal requirements, or is no longer able to carry out their mission *(Code du Travail*, Article D4644-9).

In Thailand, all Safety Officers must be registered by the employer to the Department of Labour Protection and Welfare. In Viet Nam, although there is no national registration of Occupational Safety and Health Officers, they must pass an official exam as part of the competency improvement programme *(Government Decree No. 44/2016/ND-CP,* 16 June 2016). Once the Occupational Safety and Health Officer passes the retraining exam, they will receive a certificate for OSH training. The certificate is valid for two years and training should be renewed accordingly. Finally, in Indonesia, there is an OSH expert certification (an appointment letter given by the Minister of Manpower or their representatives). Additional education and training are not required to extend the certification.

In Japan, for the Health Officer only, the employer must submit a report of appointment to the authority. There is a national license examination for the Class-1 and Class-2 Health Officers which is done by the Japan Safety and Health Technology Testing Association.

3.7 Ethics and professional practice

International professional organizations such as the International Commission on Occupational Health (ICOH), IOSH and INSHPO, have developed and promoted ethical codes of conduct for OSH professionals (beyond the generalist profession). Further inputs to the ethical conduct of the OSH profession stem from standards of knowledge and skills as part of these global OSH frameworks. The IOSH (2022) Competency Framework includes several ethical practice provisions, ranging from organizational issues such as ethical business practices, through to behavioural competencies like "personal responsibilities and accountabilities" and "professional integrity". INSHPO covers some aspects of ethics and professional practice in its *Capability Framework* (2017a).

In this research, none of the countries reviewed were found to currently possess or endorse an ethical code as part of legislation. Instead, countries seem to rely on the various professional associations to set, monitor, and enforce ethical conduct. In countries where these associations are well-regarded, membership is seen as valued and desirable by OSH professionals, and employers recognize and value certification and membership status. In countries without a strong OSH professional association presence and a lack of ethical conduct codes or standards, there is limited recourse to align practice and ensure high standards are maintained. Table 10 summarizes the various reviewed roles for regulators and associations in relation to developing and promoting ethical standards.

Table 10. Ethical codes of conduct or practice, by country

Country	Ethical code of conduct or practice
Australia	The AIHS has developed an ethical code of conduct which is incorporated into membership and certification requirements. A professional standards committee investigates ethical complaints against members. The OSH Body of Knowledge includes an advanced chapter on ethics and the AIHS has also developed two online training programmes supporting ethical practice.
Canada	Both the Board of Canadian Registered Safety Professionals (BCRSP) and the Canadian Society of Safety Engineering have developed ethical codes of practice for their members. Internal member investigation and disciplinary processes are in place. The BCRSP has a mandatory two-hour professional ethics course that is required for each CPD cycle.
France	This research could not find any mandatory codes of ethics or professional standards practice required to be upheld by legislation or professional associations for the competent employee or the IPRP. However, regarding the IPRP, within the framework of agreements signed between the independent IPRP and the employer (which define the activities and terms of IPRP functions) certain guarantees are included, for instance, that of working conditions that ensure the independence of the IPRP (INRS 2020). Other various agreements and contracts entered between an IPRP and an employer may also contain ethical and professional practice standards.

Country	Ethical code of conduct or practice
Indonesia	No formal code of ethics exists as part of the requirements to be appointed as an OSH expert, other than they must be of "good behaviour", which largely relates to criminal history. No formally recognized OSH professional association yet exists in Indonesia.
Jamaica	No formal code of ethics exists in Jamaica for OSH professionals. OSH professionals in Jamaica do not have a localized code of ethics or professional practice standards.
Japan	In Japan, there is no formalized or regulated code of ethics for the positions of Safety Officer, Health Officer, and Safety and Health Advocator.
New Zealand	Professional associations in New Zealand have developed their own ethical codes and require members to follow them.
Republic of Korea	Neither the project desktop research nor interviews identified any specific ethical codes or standards of OSH professional practice.
Singapore	SISO has developed its own (brief) ethical code and requirements.
Spain	Various professional associations have developed ethical codes.
Thailand	OSHWA has developed a professional code of ethics for OSH but according to research interviews has apparently not developed the required infrastructure to enforce or implement this code.
United Kingdom	Members of professional associations like IOSH are required to complete a structured training course on professional ethics.
United States	Professional OSH associations such as the BCSP and ASSP have a code of ethics that each certified person/member must commit to on a regular basis.
Viet Nam	There is no ethical code of conduct for OSH professionals in Viet Nam.

3.8 Responsibility and liability of professionals

The research identified few examples of documented OSH professional prosecutions by government regulators. Legislation in most countries typically apportions primary OSH responsibility to the employer rather than the OSH professional as an individual.

OSH professionals may technically still be held liable through general provisions relating to either a company officer (someone with major decision-making power and control in a company) and/or as a worker. An example of this possibility is in Australia; whereby company officers are required to exhibit adequate awareness of OSH risks and exercise due diligence. The officers must keep up-to-date with the latest OSH developments, so far as reasonably practicable. This has implications for CPD, but this is as yet an untested proposition legally. The second avenue through which an OSH professional may be held generally liable is through showing reckless, careless, or otherwise grossly negligent behaviour that puts another person at risk in the workplace. Again, this is an untested proposition. With the recent introduction of industrial manslaughter laws in Australia, OSH professionals may even be given prison sentences and heavy fines, if they fit the criteria of being an Officer and have shown inadequate execution of due diligence obligations.

Spain and Singapore have a prescriptive environment in which OSH professionals are regulated, and there are some examples of prosecution. In these countries, OSH professionals must demonstrate competent performance of specific tasks and duties, particularly in the areas of providing competent advice and in conducting effective risk assessment and management activities. Table 11 summarizes the liability context of OSH professionals for each reviewed country, along with any discovered prosecutions or case law.

Table 11. OSH professional liabilities and examples of prosecutions, by country

Country	Are OSH professionals legally liable?	Examples of prosecutions involving OSH professionals
Australia	Though not specifically stated, an OSH professional may be held responsible under provisions relating to "Officers" who are personnel that have decision-making authority and control in the organization *(Model Work Health and Safety Bill*, 2019; Division 4, S27). An OSH professional may also be found personally liable as a PCBU if they do not comply with general duties of care *(Model Work Health and Safety Bill,* 2019; Division 4, S28).	None found
Canada	Though not specifically stated, an OSH professional may be held responsible under provisions stemming from the *Westray Bill (Bill C-45)* 2004, which amended the Canadian Criminal Code to include specific OSH responsibilities for persons who have authority over others.	None found. However, interviews suggest that OSH professionals have been prosecuted but only when operating outside their core OSH roles (as an operations manager, work supervisor or manager).

Country	Are OSH professionals legally liable?	Examples of prosecutions involving OSH professionals
France	A 2012 Ministry of Labour Circular states that appointing a competent person does not transfer the employer's responsibility to that person unless the designated employee also holds a delegation of authority. To be valid, this delegation of power must meet the criteria defined by case law: the delegate must have the authority, competence, financial, human and organizational resources to carry out their tasks. However, the person in charge of security is personally and criminally liable for any faults committed in the exercise of their duties (Menard, 2017).	None found
Indonesia	Not specifically stated. Per the *Work Safety Act* (1970), a manager is considered a person with the duty to lead a workplace or its branch, and therefore may held personally liable.	None found
Jamaica	Not specifically stated. Jamaica has been operating under the *Factories Act* (1943) and its attendant regulations which have no targeted legislation towards OSH professionals.	None found
Japan	No. OSH legislation focuses on employers and fines can be directed toward employers if the Safety or Health Officer fails to fulfil their duties (*Industrial Safety and Health Act,* Article 120, 1972).	None found
New Zealand	Not specifically stated. An OSH professional may be held responsible under provisions relating to "Officers" who are considered personnel with decision-making authority/ control in the workplace *(Health and Safety at Work Act*, 2015, Section 44).	None found. Interviews suggest that OSH professionals were targeted by regulators for prosecution. The cases were later dropped after further investigation.
Republic of Korea	No. The focus of OSH legislation is on employers. Employers can be held liable (in the form of significant financial penalties) for failing to appoint an OSH professional as required by law.	None found

Country	Are OSH professionals legally liable?	Examples of prosecutions involving OSH professionals
Singapore	Yes. WSHOs have specific duties relating to risk management, provision of advice, and implementation support *(Workplace Safety and Health Regulations*, 2007; Article 9). Similar provisions exist for WSH Coordinators *(WSH Regulations,* 2009; Article 7) and Auditors *(WSH Regulations*, 2009; Article 12).	Two specific cases involving WSHOs were found, whereby either a fine was imposed *(Public Prosecutor v Lim Tze Fong [2012] SGDC 96)* or imprisonment *(Public Prosecutor v Tan Wee Meng (Chen Weiming) and another [2020] SGDC 232).*
Spain	Yes. Prevention Technicians have specific duties and legal obligations related to their tasks and role scope. Case law suggests that OSH professionals may be held liable under the *Civil Code* (Article 1902A) and criminally under the *Law on Prevention of Occupational Risks* (Article 31.2).	Several cases exist where prevention technicians have been found criminally liable.
Thailand	No. The focus of the *Occupational Safety, Health and Environment Act* (2011) is on the employer or business operator.	None found
United Kingdom	Not specifically stated, although a competent OSH professional is required to be appointed by employers *(Management of Health and Safety at Work Regulations,* 1999), they may be found liable if negligence can be proven or a failure to exercise reasonable due care for the prevention of harm to others in the business.	In one case relating to a consultant company, one of its directors was found liable for the death of a construction worker. Interviews revealed that there have been cases in which OSH professionals were prosecuted and deemed "recklessly negligent". Examples are summarized in the *OSH Body of Knowledge,* (AIHS 2019).
United States	No. The focus of OSH legislation in the United States is on employers.	None found, though interviews suggested that OSH professionals were found personally liable in the past.
Viet Nam	No. The focus of OSH legislation is on employers.	None found

3.9 Entry into the profession

Subject experts interviewed for this research agreed that the promotion and overall awareness of the OSH profession (globally) is currently low. Interviewees stated that across most countries, OSH professionals find themselves "falling into" the career because of two main reasons: a personal direct or indirect experience with workplace safety and health (e.g. the person was victim of an occupational injury) or as part of a later career stage following time in an operational or production-oriented role. In some countries like Australia, where the resources sector creates lucrative employment conditions, high salaries may attract candidates (of varying levels of suitability). Interviewees agreed that internationally, OSH awareness amongst secondary school leavers and tertiary students is generally low, and that more could be done to build the profile of the profession so that it is selected as a first and appealing career choice, particularly among university-educated graduates.

Initiatives in New Zealand, such as HASANZ's Health and Safety Generalist Pathway Initiative (2021), represent contemporary efforts to clarify the nature and boundaries of the OSH profession, influence employers and their talent supply chain (recruiters), and promote awareness of the profession from a diverse range of talent sources (e.g., high school finishers, tertiary students, recent college graduates). In a suite of guidance material released for specific stakeholder groups, HASANZ aims to compare the generalist OSH professional role against other OSH disciplines, promote awareness of labour market conditions and employability, and describe the characteristics of a competent and capable OSH professional.

3.10 Emerging challenges

Each interviewee was asked to describe up to three core challenges that they felt were emerging yet would play a distinct and significant role in shaping the future of the OSH profession. Key themes which were raised included:

- management of psychosocial risk and hazard:
  - harassment
  - poorly designed jobs
  - increased sources of work-related stress
- the changing world of work and job design:
  - blurred work/home boundaries
  - increased connectivity
  - the 'gig' economy or contract/contingent workforce
  - the expansion of telework and subsequent sedentary behaviours
- emerging technologies – with unknown or unclear risks (nanotechnology, endocrine disruptors).

The rising global awareness of psychosocial risk, specifically with respect to maintaining mental health and promoting employee well-being has been spurred on by business case viability (PricewaterhouseCoopers 2014), public campaigns (Heads Together 2022), and growing recognition of the organizational benefits of a healthy and engaged workforce (Nielsen et al. 2017). Yet, psychosocial hazard identification and management has traditionally been excluded from the OSH professional's skill sets, with technical guidance material only recently being produced by OSH regulators (Australia 2021) and professional associations. The COVID-19 pandemic has accelerated the growing recognition of psychosocial risk and even put a positive spotlight on the OSH profession through its ability to help businesses navigate these challenges and contribute value in previously unexplored areas of practice (Casey, Hu and Wu 2021; Provan et al. 2020). Further developments in OSH management systems standards will continue this trend and broaden professional skill sets in new directions.

Changing world of work issues carry many implications for OSH professionals. Indeed, growing numbers of contract, contingent, and gig economy workers where temporary projects or assignments are exchanged for a fixed fee mean that OSH professionals will need new ways to plug gaps in existing legislation. They will also have to interpret compliance requirements to reduce legal exposure, successfully identify and manage competing demands and tensions, and generally accomplish OSH objectives (Hu, Casey and Griffin 2020). In countries that lack regulated protections for OSH professionals, such as registration, certification, and role definition, the gig economy may further stimulate the propagation of under-qualified OSH staff; in effect, a "cheapening" of the profession by introducing a hyper-competitive and on-demand outsourcing of OSH resources.

Finally, emerging technologies, public health emergencies, and chemical risks appear to be front-of-mind for many OSH professionals. Historical lessons ring true here, for instance, the proliferation and subsequent prohibition of asbestos following identification of serious health exposure risks (Bartrip 2004). OSH professionals are perhaps rightfully wary of new chemicals, substances, and materials that carry risks over long-term exposure. In Queensland, Australia, *black lung* (Australia. Queensland Government 2017) and *industrial silicosis* (Kirby 2019) are examples of recent "surprise" hazards that have significantly impacted the mining and construction industries. Although these are well known hazards now, a languishing of risk awareness combined with changes to production demand or execution can mean that OSH professionals need to rapidly upskill in specific environments to protect the workforce.

4. Discussion

4.1 Implications of research

Research findings point to four main approaches to OSH professional-related legislation: i) *the prescriptive approach* (e.g., Japan, the Republic of Korea); ii) *principle-based approach* (e.g., Australia, the United Kingdom); iii) *the hybrid approach* which has a focus on standards and regulations (e.g., the United States); and iv) the *European Union* approach which illustrates some interesting differences between the two European countries reviewed, France and Spain.

Prescriptive approaches to OSH regulation seem to offer benefits in terms of greater control over the quality and consistency of OSH education and qualification, as well as enabling more efficient and targeted professionalization (e.g., national registers of OSH professionals, minimum standards for CPD and ongoing training requirements, and protected titles). Disadvantages of the prescriptive approach (and where the *principle-based* method has strengths) lies in the difficulty with adjusting qualifications and education curricula based on advances in safety and health science and the evolution of OSH roles. Further, a prescriptive approach may limit the range of options available to engage in training and continuing professional development. A compromise may exist whereby additional specificity relating to OSH professionals is inserted into legislation, requiring employers to engage competent OSH advice, along with corresponding minimum requirements around education and CPD. A useful approach to legislation development could be to specify outcomes of the OSH professional or "expert/competent advisor" engaged by employers. This would mean that such resources must help employers to fulfil their duties and obligations related to OSH management. This approach could assist with giving the professional some structure.

Mandatory training arrangements specified for OSH professionals in prescriptive countries tends to be minimal and potentially inadequate. To resolve this, perhaps an approach that involves closer collaboration between policymakers, professional associations, social partners and universities could be considered. For example, HASANZ, a government established OSH entity, shapes the profession by defining roles, promoting education and training opportunities, and aligning the various professional associations that are associated with it. Such an association could serve the role of reviewing and accrediting OSH courses to ensure that curricula are both contemporary and relevant.

Across all countries, there are few ethical codes and professional practice standards enshrined or even referred to in national legislation. OSH management is full of dilemmas and ethical issues. How can OSH professionals manage these problems when they have limited or no ethical training, or mandatory requirements regarding their professional conduct? Professional associations with ethical codes of practice could be consulted in future research to identify common aspects and potentially identify provisions that could be regulated.

This research was unable to conduct an in-depth examination of OSH education and training programmes. According to the conducted interviews, the approach to OSH education suffers from inadequate workplace contextualization and overlap or redundancy with existing qualifications. This is particularly relevant for professionals with extended practical and/or professional OSH experience. Interviewees also stated that the regulation of qualifications and training delivery is lacklustre or inconsistent, calling into question the overall quality of OSH education. More research on education and training programmes and the identification of good practices could be helpful to advance the development of an educational framework assessment guide.

OSH qualifications and education exhibit different approaches to the inclusion of psychosocial safety and health issues. Given the rising importance of this issue across the globe (and particularly following the COVID-19 pandemic), it would be beneficial to learn how inclusion or omission of psychosocial elements affect the education and competence of OSH professionals? For instance, are OSH professionals under-qualified or lacking in confidence to deal with psychosocial risks in the workplace? Greater specificity is needed in legislation on psychosocial topics to ensure consistency across education programmes. Regarding non-technical skills, such as communication and negotiation, some countries, such as Spain, include prescription and scope, while other countries do not. How does this shape the role and effectiveness of OSH professionals?

In France, Japan and Spain, occupational health services play an important role in OSH prevention in enterprises. Typically, these services are composed of a multi-disciplinary team of professionals and are set up in enterprises, outside enterprises and/or as a joint service shared between enterprises. In France and Spain, “joint prevention services” enable smaller businesses to leverage resources to have access to occupational health services when they are located in close proximity and/or sharing similar industrial contexts. Further investigation and research could be conducted to identify the corresponding job demands for OSH professionals working under such arrangements and to identify ways to improve collaboration between the different professionals. More research could also be conducted to evaluate the effectiveness of joint prevention services, depending on the configuration and competence of OSH professionals engaged in these services.

4.2 Future research

Potential future research areas are numerous, as this project has taken a broad and macro perspective through an analysis of OSH qualification systems across 14 different countries. Areas of future research identified by the workshop participants are summarized by Table 12.

Table 12. Additional research recommended by workshop participants

Research topic	Rationale
Ethics, and national culture interactions	Ethical issues are commonplace for OSH professionals, with potential for conflicts of interest. Knowing more about the ethical dilemmas faced by OSH professionals and how to handle them, was identified as a priority. The interactions between ethical standards and constraints – as a function of national culture – was also identified as important.
Professional supervision	Supervision by peers and expert mentors is a common requirement of other professions. How can OSH professionals benefit from supervision, and how could this supervision optimally be delivered?
Transition to digital jobs and corresponding changes in risk profiles	The changing world of work means that OSH professionals will need to develop skills in managing particular occupational hazards, such as psychosocial and ergonomic hazards. Human/technology interactions may also become of interest to OSH professionals (e.g., collaborative robots).
Skills of OSH professionals in the digital age	Given that many OSH professionals' scope of work encompasses security, and that cyber incidents can cause harm to individuals, what is the role of the OSH professional? Hacking may also present a future threat to health and safety through compromising existing hazard controls.
Role of the Labour Inspector	Emerging advances in OSH practices and industrial technology indicate that Labour Inspectors will need to keep pace with progress to remain effective. How can Labour Inspectors benefit from the advancement of the OSH profession?
Cooperation and interaction between policymakers and industry	Enhanced cooperation and collaboration between policymakers and industry may lead to better OSH outcomes. How can this relationship create synergies and better impacts on organizational safety and health? What are the benefits in engaging cooperatively/collectively?
Advantages/disadvantages of different regulatory models between prescriptive and flexible countries – maturity approach?	It is possible that developing countries may benefit initially from a prescriptive approach to OSH. Is a maturity or staged model for OSH regulation the most appropriate one?
What is the value of certification programmes?	Professional associations typically offer structured certification programmes. However, are these programmes making a tangible impact on OSH performance and outcomes?

The current research project had numerous research questions, which were useful to gain an appreciation of the country-specific national systems for the qualifications of OSH professionals. Overall, a "deeper dive" into OSH qualification frameworks could be done, potentially through identifying countries with sophisticated frameworks and analysing their main features in more detail.

It is recommended to conduct additional focused research in selected countries identified as representing best practice in OSH education and regulation. Australia, Singapore, and potentially some regions in Canada might be candidates for this more detailed investigation.

An additional area to explore in conjunction with the above could be to evaluate the effectiveness of OSH qualification frameworks in each targeted country (e.g., through
a combination of desktop research and more extensive subject matter expert consultation). Effectiveness is a broad term, so it is vital that boundaries are established proactively that might cover:

- industry-readiness of OSH graduates;
- level of contemporary content of OSH training/education programmes; and
- number of OSH graduates as a ratio of industry demand.

Effectiveness criteria and data could be established through consulting groups of subject matter experts in each targeted country and conducting a focus group rating exercise or similar qualitative and consensus-based methodology.

This research largely took a federal or national level perspective. Ad hoc state and territorial level investigations for Australia revealed marked variation in how different levels of legislation refer to and affect the OSH professional. Similar steps could be taken for other countries (e.g., Canada) given OSH references that were missed by this federal-level scan. State or province-level legislation (e.g., Alberta in Canada) currently being developed or already in existence may affect OSH professionals directly (e.g., registration and licencing, education, and qualifications). There are also likely to be significant differences in OSH education and qualification within countries that have complex state and territory level structures, such as the United States. Background research could be done to identify states/territories that represent best practice and focus efforts on these areas.

Interviews conducted as part of this project indicated that OSH professionals have a diverse range of paths and transitions throughout their careers as representatives, practitioners and professionals. Further research could contribute to a better understanding of how these transitions are facilitated or impeded by OSH qualification frameworks, and how appropriate levels of professionalization and attainment of required capabilities are developed along the way.

Deeper exploration of the interrelationships between and among governments, professional associations, consultants, and training organizations could be done. For instance, in many English-speaking countries with principle-based OSH legislation, there is a complex interactive web between policymakers, universities, vocational training organizations, and industry. There is wide variety in the OSH-related education options and corresponding qualifications, all of which are themselves shaped by a variety of factors. This contrasts with the approach taken by Singapore which incorporates additional centralization and consistency in OSH qualifications and education, but not to the highly prescriptive extent of other South-East Asian countries such as Thailand and Viet Nam.

Future research could also consider and review efforts on the professionalization of OSH, as well as areas where such professionalization has already occurred (e.g., psychologists in Australia). OSH professionalization is gaining momentum and in countries such as Australia, with a number of contributing factors. To name just a few there is: the formalization of the OSH Body of Knowledge; an expanding number of active professional associations; certification is also more common; and finally, clear and defined OSH roles are being adopted. Reaching a better understanding of how protected roles (such as those of psychologists and medical doctors) are qualified, educated, and regulated may provide insights into best practice for OSH professionals (Australia 2021).

Finally, it could be beneficial to investigate how regulators could better and more directly support OSH capability to manage emerging risks within organizations. An example is the growing recognition of psychosocial risks. In Australia, many OSH professionals (including Labour Inspectors) lack confidence to effectively identify and manage psychosocial risks (Potter et al. 2019). Further research could be conducted into how OSH regulators can effectively upskill professional capabilities and ensure that curricula continue to be relevant into the future.

4.3 Recommendations to support countries

As part of the end-of-research workshop, participants also discussed how the research might impact or guide the implementation of OSH qualification systems among developing countries. The breakout session covered two overarching questions and identified specific gaps or needs to be addressed, as shown below:

- *What are the constraints and barriers that developing countries face regarding qualification of OSH professionals?*
- *What support would countries need to assess/develop/implement a national OSH qualification system?*

Regarding the first question that focused on constraints and barriers, the following points were raised as items to address:

- Gaps and/or lack of regulation, such as minimum hours of training, and basic competence requirements
- Limited training capacity due to lack of qualified trainers and lack of financial resources
- Lack of quality control of training institutions
- Lack of both a recognition system and adequate promotion of entry into the profession
- Lack of certification options and guarantees of qualifications
- Lack of awareness of the OSH profession and the subsequent difficulty to attract people to the profession
- Lack of stipulations in OSH regulations to require employers to hire professionals
- Training opportunities currently limited to high level/university, which further limits options for smaller enterprises
- Gaps between demand and supply of training opportunities

Regarding the second question that focused on the support for assessing, developing, and implementing a national OSH qualification system in developing countries, the following needs were identified:

- Identify the different dimensions and elements of an OSH qualification system (i.e., pros and cons of each approach, including examples)
- Define a normative and institutional OSH framework (involving all stakeholders)
- Build minimum international basic standards for the OSH profession
- Ensure that all guidance material is adaptable to different country contexts
- In the context of national OSH qualification systems, consider the particular needs of the informal economy and small and medium-sized enterprises
- Conduct country-level needs assessments
- Develop a model for OSH workforce planning that can assess and forecast different needs for OSH qualifications

Conclusions

This research examined OSH qualification systems across 14 different countries, covering i) regulation; ii) qualifications; iii) education and training; iv) professional associations; v) ethics and practice standards; and vi) current and emerging challenges faced by OSH professionals.

A conclusion of this research is that finding a one-size-fits-all solution for developing OSH qualification systems is unlikely. Future guidance should consider diverse examples from various countries and contexts. For instance, the Australian qualification framework offers a range of options for experiential practice-based competence, as well as for vocational and tertiary study, Singapore's approach to providing options for education, registration, certification, and professional development, and Viet Nam and Spain graded approaches to OSH competence and capability, are all useful models to consider.

The OSH profession is diverse and increasingly seeking formal professional status in many countries, with the generalist OSH role already being a protected and registered title in Singapore. It seems, therefore, important to formalize OSH education and qualifications in a way that keeps education current and relevant, such as through principle-based legislative approaches and professional associations.

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