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OHS

OCCUPATIONAL HEALTH & SAFETY LABOUR MARKET INFORMATION

Research Report

Current and Future Labour Market Issues Facing the OHS Profession in BC's Manufacturing Sector

Canada

British Columbia

Funding provided through the Canada-British Columbia Labour Market Development Agreement.

Prepared by the Manufacturing Safety Alliance of BC

The Manufacturing Safety Alliance of BC (the Alliance) is a not-for-profit, industry-driven, industry-funded health and safety association for manufacturing and food processing companies in British Columbia.

Serving over 3,000 employers across 49 classification units, the Alliance's guiding principle is to create and maintain a united resource so that the manufacturing and food processing industries can improve health and safety, reduce injury rates, and reduce insurance premiums.

Research was conducted by the Graham Lowe Group

The Graham Lowe Group is a workplace consulting and research firm based in Kelowna, BC. Dr. Graham Lowe, president of the Graham Lowe Group, has over three decades of organizational, labour market, and employment policy consulting experience.

His research expertise includes labour market studies, worker attitudes and behaviour, education and training outcomes, and future work trends. It also includes policy-oriented research for governments nationally and internationally, focusing on human resource development and utilization and workplace learning issues.

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THE GRAHAM LOWE GROUP

Prepared for the British Columbia Ministry of Jobs, Tourism & Skills Training

The views and opinions expressed in this report are those of the project partners and do not necessarily reflect the official policy or position of the BC government.

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Contents

Acknowledgements 1

Executive Summary 2

Implications of manufacturing sector trends for OHS 3
OHS competencies and qualifications 3
The OHS workforce in BC manufacturing 4
Future supply and demand in OHS occupations 4
Effective OHS practices 5
BC manufacturers' future OHS challenges 5
Implications for BC manufacturers and industry partners 6
Issues for future research 7

1 Introduction 8

1.1 Background 8
1.2 Scope of labour market issues in BC's manufacturing sector 10
1.3 Report objectives 12
1.4 Approach 13
1.5 Report outline 14

2 BC's Manufacturing Sector and its Workforce 17

2.1 The manufacturing sector in BC 17
2.2 The manufacturing workforce in BC 19
2.3 Manufacturing workforce demographics and trends 22
2.4 Workforce demographics of firms participating in the survey 23
2.5 Profile of manufacturing companies surveyed 24
2.6 Implications for OHS in manufacturing 27

3 OHS Competencies and Education/Training Opportunities 29

3.1 The evolving OHS profession 29
3.2 An international perspective on rising standards for OHS professionals 30
3.3 The Canadian OHS experience 32
3.4 OHS post-secondary education programs 33
3.5 OHS professional certifications in Canada and BC 36
3.6 Summary of OHS certifications 38
3.7 Qualifications required for different OHS roles 39
3.8 Other opportunities for post-secondary OHS education 40
3.9 Labour market mobility 41
3.10 Summary 42

4 The OHS Workforce in Firms Surveyed **44**
4.1 Qualifications, roles and responsibilities 44
4.2 Recruitment, development and retention of OHS personnel 49
4.3 OHS qualifications manufacturing firms look for when recruiting 52
4.4 Variations in use of OHS personnel by firm characteristics 55
4.5 Professional qualifications of OHS personnel 58
4.6 Summary 60

5 Supply and Demand Projections for OHS Occupations **63**
5.1 COPS occupational projections for Canada 64
5.2 British Columbia 2025 Labour Market Outlook 67
5.3 Assessing labour market projections for OHS occupations 68
5.4 Summary 70

6 Effective OHS Practices for BC Manufacturing **73**
6.1 Evidence-based effective practices for improving workplace safety 74
6.2 BC manufacturing firms' safety practices and performance 83
6.3 Summary 94

7 BC's Manufacturers Future OHS Challenges **96**
7.1 Survey findings on OHS challenges 96
7.2 Focus group and interview findings on future OHS challenges 104
7.3 Summary 105

8 Conclusions **107**
8.1 Summary of key findings 108
8.2 Implications for BC manufacturers and industry partners 112
8.3 Issues for future research 114

Appendix A: Sector Labour Market Partnership Steering Committee Membership 117

Appendix B: Survey Methodology and Questionnaire 118

B.1 Survey methodology 118

B.2 Profile of survey respondents 120

B.3 Profile of survey respondents' firms 122

B.4 Survey questionnaire 125

Appendix C: Focus Group Methodology 137

C.1. Methodology overview 137

C.2. Focus group questions 138

Appendix D: Key Informant Interviews 141

D.1 Overview of key informant interviews 141

D.2 Key informant interview questions 141

Appendix E: Description of OHS certifications in Canada 144

E.1 Canadian Certified Professional Ergonomist (CCPE) 144

E.2 Canadian Registered Safety Professional (CRSP) 144

E.3 Certified Health and Safety Consultant (CHSC) 145

E.4 Certified Health and Safety Management System Auditor (CHSMSA) 145

E.5 Occupational Health Nurses (OHN) 145

E.6 Registered Occupational Hygienists and Technologists (ROH/ROHT) 146

E.7 National Construction Safety Officer 146

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Finally, the labour market research report would not have been possible without the cooperation of the 322 individuals who responded to the on-line survey, the 26 focus group participants, and 13 key informants who agreed to be interviewed.

Executive Summary

This report presents findings from industry-led labour market research into the Occupational Health and Safety (OHS) labour market needs of British Columbia's manufacturing sector. The research was conducted by a Sector Labour Market Partnership (Sector LMP) led by the Manufacturing Safety Alliance of BC, with oversight provided by a Steering Committee consisting of representation from manufacturing firms, industry and business associations, labour organizations and post-secondary educational institutions.

Manufacturing industries play a vital role in British Columbia's economy. In 2016, manufacturing contributed $16 billion to the BC economy, accounting for 7.3% of the provincial GDP.[1] It is a growing sector, with capital investments outpacing manufacturers in other provinces in recent years.[2] Employing 170,100 workers in 2016, manufacturing accounts for 7% of the provincial workforce.

The future of BC's manufacturing sector depends on how effectively companies meet a number of significant economic, technological, workforce and regulatory trends. These trends present OHS risks and challenges. It is essential that manufacturers are able to acquire the expertise and resources needed to address these issues. Indeed, improvements in workplace safety are a precondition for a thriving manufacturing sector in BC, especially given the relatively high injury rates in the industry today.

1 Statistics Canada, CANSIM, Table 379-0030. Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS), provinces and territories, annual. Based on 2007 chained (i.e., inflation adjusted) dollars.

2 BC Stats. (2015). *A Profile of British Columbia's Manufacturing Sector.* Prepared for Ministry of Jobs, Tourism and Skills Training, 41.

Approach

The report is based on information gathered through:

- Analysis of statistical data from industry, government and association sources;
- Reviews of academic and grey literature on OHS topics relevant to manufacturing;
- A survey of BC manufacturers conducted during January to March 2017;
- Five regional focus groups with representatives from 26 manufacturers; and,
- Thirteen key-informant interviews.

Implications of manufacturing sector trends for OHS

- An aging and more diverse workforce and sector growth will create increasing challenges in terms of training new workers on safe work practices.
- Automated production processes could improve safety because of the training programs associated with new equipment and reduced worker contact with machinery.
- Increasing workforce diversity may require new approaches to OHS training. This could include OHS training for workers who speak English as a second language and new approaches to learning that, above all, must target the relatively high injury rates in medium-size firms.

OHS competencies and qualifications

- The term 'OHS professional' is difficult to define. There is no consensus on the body of skills and knowledge, professional designations or credentials required to be an OHS professional. No specific OHS professional qualification is considered essential for an OHS role in manufacturing. However, moves to standardize OHS credentials at a higher level could transform Canada's OHS education and certification landscape over the next five to ten years.
- A common path into the OHS profession in BC manufacturing is through a mid-career move. Existing BC post-secondary certificate programs and shorter OHS designations are suited to these adult learners. However, the lack of consistency and standards in OHS education and certification make it difficult to identify the specific steps someone would need to take to successfully make this career transition into an OHS role.

The OHS workforce in BC manufacturing

- Just over half of the companies surveyed employ a full-time OHS worker who provides a wide range of support to improve safety performance.
- Firms are more likely to train an existing employee for an OHS role than to recruit externally. Many workers in OHS positions have no formal OHS credentials.
- Based on recruitment and retention experiences of firms in the survey, as well as their internal development of employees for OHS roles, there appears to be an adequate supply of qualified OHS personnel within BC.
- According to survey results, important job requirements include OHS knowledge and experience in an OHS role. Specific OHS credentials, manufacturing industry work experience, and non-OHS skills are less important.
- Focus group discussions emphasized the importance of soft skills (e.g., communication, leadership, mentoring) for success in an OHS role. It will be important to define the essential soft skills required by OHS professionals in manufacturing.

Future supply and demand in OHS occupations

- National projections for OHS occupations show a balance of demand and supply between now and 2024. The British Columbia 2025 Labour Market Outlook estimates 1,300 OHS job openings. OHS programs at BC's post-secondary institutions are expected to provide an adequate supply of qualified candidates for these positions.
- Manufacturers could meet increased demand either through external recruitment or the internal development of OHS expertise.
- The study's primary research findings are consistent with these projections. However, four major trends could influence the BC labour market for OHS professionals over the next five to ten years: the changing economic environment; rising standards for OHS certification; increased supply chain requirements for OHS management systems; and, new WorkSafeBC regulations.

Effective OHS practices

- Improved safety performance in BC manufacturing firms is associated with a combination of evidence-based effective safety practices, regardless of sub-sector or region. One of these practices is having a dedicated safety position.
- Large firms are significantly more likely than small or medium-size ones to be employing, recruiting or internally training OHS personnel, or to be using other OHS effective practices.
- Membership in a safety association and/or health and safety management system certification is associated with recent improvements in safety performance.

BC manufacturers' future OHS challenges

- There is a need to provide employees with additional OHS training in order to meet company OHS goals. This training should be evaluated to determine its effectiveness.
- Company growth and new work processes present the greatest future OHS risks. In contrast, new automated technologies have the potential to improve workplace safety.
- Other major OHS challenges manufacturing firms expect to face include workforce aging, creating a safety culture, and providing OHS education and training. Few respondents see hiring an OHS professional as a way to address future OHS challenges.

Implications for BC manufacturers and industry partners

Based on the background and primary research conducted by this Sector LMP, the report identifies seven practical implications for BC manufacturers and industry partners, including:

1. **Training effectiveness.** Given that OHS training is essential for workplace safety, its effectiveness could be improved by incorporating more options for individual self-paced and internet-based learning in short modules. Evaluation should be incorporated into all OHS training in order to determine if learning and behavioural change goals are being met, and to identify opportunities for improvement.
2. **Mid-career entry into OHS roles.** The prevalence of mid-career transitions into OHS roles for manufacturing workers signals a continued and possibly growing need for certificate programs as a convenient route to upgrading OHS knowledge and skills. Manufacturing-specific courses could meet some of the requirements for one or more existing OHS post-secondary programs.
3. **Safety certifications.** Health and safety management systems contribute to a safe workplace. Encouraging the adoption of OHS management systems through safety certifications is one pathway to improved OHS performance.
4. **Joint health and safety committees.** These committees have a positive influence on a firm's safety performance. To be effective, committee members require appropriate education and training, must feel empowered, and need resources and capabilities to monitor leading safety indicators.
5. **Regional resources.** The availability of regionally-based safety advisors and other shared resources are crucial for small and medium-size firms (SMEs) to acquire the OHS expertise they require to implement OHS management systems, provide employee training and embark upon a safety certification process.
6. **OHS value proposition.** Helping senior management understand the value of OHS – and the crucial role that OHS professionals play in delivering that value – is an on-going challenge in BC and other jurisdictions. Project partners can help to address this challenge by developing an OHS 'value proposition' for BC manufacturers, which defines the core competencies of an OHS professional in manufacturing. These core competencies should include relevant soft skills. More broadly, project partners could contribute to the development of a core set of OHS educational standards and a centralized body to regulate OHS certification.
7. **Target SMEs.** Also required is on-going education and awareness-raising efforts targeted at SMEs – especially medium-size firms given their relatively high lost-time injury rates. It may be helpful to approach OHS as a quality improvement initiative. Developing easy-to-use diagnostic tools would also help SMEs to identify opportunities to make their workplaces safer.

Issues for future research

In addressing the research questions relevant to this Sector Labour Market Partnership, the study identified the following eight issues which require further research.

1. Monitor the trend toward standardized and higher-level OHS credentials, especially to document the impact on OHS education and certification in BC over the next five to ten years. In this regard, it would be useful to know the extent to which different post-secondary OHS programs in BC provide a common body of knowledge, as well as the labour market outcomes of their graduates.
2. Document the specific combination of knowledge, skills and experience that best meets the OHS needs of manufacturers. This would include a clear definition of the essential soft skills that OHS professionals require to lead safety improvements.
3. Create a centralized database of the number of OHS practitioners in BC and their qualifications. This would inform labour market planning by industry and post-secondary institutions.
4. To improve the recruitment and retention of OHS personnel, examine why a relatively high proportion of these workers were dismissed, rather than left voluntarily. Also examine why companies internally develop workers for OHS positions, rather than relying on external recruitment, and whether these different strategies influence safety performance.
5. Embed an evaluation framework into future OHS training in order to improve its effectiveness. WorkSafeBC's new training requirements for worker health and safety reps and joint health and safety committees provide an opportunity to develop an evaluation framework that meets the needs of the manufacturing sector.
6. Document how better safety outcomes could be achieved in BC manufacturing firms by using diagnostic tools, such as the Institute for Work and Health's Organizational Performance Metric.
7. Investigate the barriers and enablers of manufacturing firms participating in safety associations and adopting OHS management systems.
8. Develop a better understanding of the actions required to build a safety culture in manufacturing firms.

1 Introduction

1.1 Background

Manufacturing industries play a vital role in British Columbia's economy. In 2016, manufacturing contributed $16 billion to the BC economy, accounting for 7.3% of the provincial GDP.[3] It is a growing sector, with capital investments outpacing manufacturers in other provinces in recent years.[4] Employing 170,100 workers in 2016, manufacturing accounts for 7% of the provincial workforce.

The future of BC's manufacturing sector depends on how effectively companies meet a number of significant challenges. The nature of manufacturing work is changing, the manufacturing workforce is aging and becoming more diverse, the pace of technological change is accelerating and economic globalization is evolving in unpredictable ways. Firms' response to these major trends will affect their growth potential. Equally important in this regard are the steps firms take to create and maintain healthy and safe workplaces, especially given that the challenges just noted will create new occupational health and safety (OHS) risks.

Reducing the relatively high injury rates in BC's manufacturing sector is essential for the sector's continued success. This goal has become particularly urgent in the face of rising public and supply chain expectations for improved workplace safety, as well as increased oversight and regulation from WorkSafeBC. There is no doubt that manufacturing employers must take concerted actions to improve their OHS systems. Moving in this direction requires a proactive approach to promoting safety cultures that can best be achieved by industry-led OHS professional training and development.

3 Statistics Canada, CANSIM, Table 379-0030. Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS), provinces and territories, annual. Based on 2007 chained (i.e., inflation adjusted) dollars.

4 BC Stats. (2015). *A Profile of British Columbia's Manufacturing Sector,* Prepared for Ministry of Jobs, Tourism and Skills Training, 41.

1.2 Scope of labour market issues in BC's manufacturing sector

In response to these OHS challenges, the Manufacturing Safety Alliance of BC launched a Sector Labour Market Partnership (Sector LMP) in 2016. Phase 1 of the Sector LMP consulted manufacturing industry partners about the need for a comprehensive labour market information study to identify the types of OHS expertise that manufacturers will require over the next five to ten years to make workplaces safer.[5] The partners formed a project Steering Committee, which led the Phase 2 labour market information research described in this report (see Appendix A for a list of Steering Committee members).

The industry partners consulted in Phase 1 concluded that further research would enable manufacturing firms and their industry partners to take an evidence-based approach to addressing a wide range of OHS-related issues. These issues included:

Increased competition for OHS professionals: There is a perceived shortage of trained OHS professionals, which will only increase with the projected growth of the manufacturing sector. A more competitive OHS labour market could disadvantage small and medium size firms (SMEs). Larger organizations are better able to recruit OHS professionals than manufacturing SMEs and those operating in remote regions. This calls for different approaches to OHS training and education in workplaces.

Changing workforce demographics: The manufacturing workforce is becoming increasingly diverse, with more immigrants and temporary workers. This combined with an aging workforce, an increased rate of retirement and more young workers will challenge employers to meet OHS training and development needs.

Rising OHS standards: New industry-wide quality certifications, workers' compensation regulations, procurement prequalification requirements and changing expectations about corporate social responsibility will contribute to increased OHS standards. These changes could also drive up the demand for OHS professionals.

5 *Sector Labour Market Phase 1 Final Report*. safetyalliancebc.ca/download/sector-labour-market-partnership-phase-1-final-report

Limitations of OHS education and training: There are no consistent standards in post-secondary OHS program entry requirements and knowledge content. The same is true of OHS professional designations. As a result, it is difficult for employers to assess the competencies of potential hires. Furthermore, there is a lack of OHS training specifically designed for manufacturing settings.

OHS competencies: New OHS competencies will be required to address changing work processes and advances in manufacturing technology, especially automation. While OHS knowledge and technical skills will remain essential, soft skills such as leadership, communication, teaching, cultural awareness and change management are becoming increasingly important for the successful OHS professional.

Diverse OHS needs within the manufacturing sector: Phase 1 consultations identified considerable diversity of OHS issues within the manufacturing sector. For example, OHS practices can vary considerably by company size and location. So too can workforce demographics, particularly the employment of immigrants for whom English is not their first language. Access to OHS resources also vary by size, sub-sector and location.

1.3 Report objectives

This report provides the results of the Phase 2 labour market information research. This research constitutes the first detailed analysis of the labour market for occupational health and safety professionals conducted in Canada. As such, it fills significant knowledge gaps regarding the labour market for OHS professionals.

The specific objectives of this report are to:

- Profile BC manufacturing sector's firms and workforce, as well as provincial labour market and economic trends likely to impact the manufacturing sector;
- Document the labour market for OHS professionals and the OHS workforce in manufacturing, including recruitment and retention issues;
- Assess OHS education and training programs available in BC, their relevance to manufacturers, and how program changes could make them more relevant;
- Investigate manufacturers' OHS training, whether this aligns with current and future OHS needs, and opportunities for meeting regional or sub-sector training requirements;
- Review OHS education and training programs in other Canadian provinces and internationally to identify approaches relevant to BC manufacturers;
- Examine how other BC industries have improved workplace safety, the role that training and education has played, and the potential to adapt these practices to manufacturing;
- Review OHS research literature to identify evidence-based 'best practices' for OHS education and training relevant to BC manufacturers;
- Identify how current OHS practices and future OHS needs vary by company size, region and sub-sector;
- Assess BC manufacturers' future OHS challenges and forecast the OHS expertise required over the next five years to drive safety improvements; and,
- Examine how the supply of OHS professionals would need to increase over the next five years to reduce lost-time injuries in manufacturing.

1.4 Approach

To meet these research objectives, the project took a multi-methodological approach which integrated information from the following secondary and primary sources:

Analysis of statistical data from Statistics Canada, supplemented by OHS and manufacturing-specific data from post-secondary institutions, industry associations, BCStats and WorkSafeBC to identify industry, labour market and educational program trends. This research focused on manufacturing industries defined by 3-digit NAICS and OHS occupations defined by 4-digit NOC classifications.

Reviews of academic and grey literature (key-word searches using University of Alberta scholarly journal databases, Google Scholar and Google) to document the labour market for OHS professionals, education and training for these personnel, essential OHS competencies, manufacturing trends that could impact OHS, OHS 'best practices' for reducing OHS risks in manufacturing, and other OHS practices relevant for BC manufacturers.

An on-line survey conducted during January to March 2017 with a representative group of BC manufacturers to assess their current OHS recruitment, retention and training practices, as well as their future needs for OHS professionals and required skill sets. A total of 322 useable responses were received for an overall response rate of 10.4% (see Appendix B for details).

Five regional focus groups conducted during March 2017 in Kelowna, Prince George, Nanaimo, Burnaby and Langley with representative employers (selected by size and subsector) to further explore the barriers and enablers manufacturers face to recruiting, training and retaining appropriately skilled OHS professionals, effective OHS practices, and future OHS challenges (see Appendix C for details).

Thirteen key-informant interviews with representatives of post-secondary institutions providing OHS programs, industry associations, and BC manufacturing employers to address remaining information gaps (see Appendix D for details).

1.5 Report outline

The report is organized around the following topics:

Section 2 describes the manufacturing sector in BC and its workforce, as well as provincial labour market and economic trends likely to affect the sector.

Section 3 describes the evolving OHS profession, the competencies and qualifications required for OHS personnel, highlighting the relevance for manufacturing.

Section 4 uses survey results to examine the OHS workforce in BC manufacturing firms, including recruitment and retention issues.

Section 5 reviews and assesses labour market projections regarding the supply of and demand for OHS professionals over the next five to ten years in Canada and in BC.

Section 6 summarizes scholarly research on effective OHS practices and uses survey results to examine the use and impact of these practices in BC manufacturing firms.

Section 7 documents the future OHS risks faced by BC manufacturers, and the resources and OHS expertise that will be required to address these challenges.

Section 8 summarizes key findings, implications for BC manufacturers and their industry partners, and identifies issues for future research.

The report's **Appendices** include the Sector LMP Steering Committee's members, the survey methodology and questionnaire, focus group and key informant interview methodologies, and a summary of OHS certifications in Canada.

2 BC's Manufacturing Sector and its Workforce

> ***This section provides a description of the manufacturing sector, and forecasted labour market conditions and trends. It provides insight on research that focused on the current and future OHS workforce characteristics while showcasing implications of these trends for OHS personnel and practices.***

2.1 The manufacturing sector in BC

Having already established the importance of manufacturing for BC's economy, it is important to define the scope of this sector.

The size of BC's manufacturing workforce declined from the early 2000s and only started to recover in the past several years. However, the sector's productivity and investments have increased at a faster rate than its workforce, in part due to increased automation. During the 2007 to 2014 period, the dollar value of manufacturing shipments increased and capital expenditures rose from $1,502 million to $2,487 million.

Figure 1: 3-Digit NAICS for Manufacturing

Non-Durable Goods	Durable Goods
311 Food manufacturing	**321** Wood product manufacturing
312 Beverage & tobacco product manufacturing	**327** Non-metallic mineral product manufacturing
313 Textile mills	**331** Primary metal manufacturing
314 Textile product mills	**332** Fabricated metal product manufacturing
315 Clothing manufacturing	**333** Machinery manufacturing
316 Leather & allied product manufacturing	**334** Computer & electronic product manufacturing
322 Paper manufacturing	**335** Electrical equipment, appliance & component manufacturing
323 Printing & related support activities	**336** Transportation equipment manufacturing
324 Petroleum & coal product manufacturing	**337** Furniture & related product manufacturing
325 Chemical manufacturing	**339** Miscellaneous manufacturing
326 Plastics & rubber products manufacturing	

Source: Statistics Canada statcan.gc.ca/eng/subjects/standard/naics/2012/introduction

These positive gains in manufacturing performance were achieved with a relatively smaller workforce. Indeed, between 2007 and 2014 the manufacturing sector's workforce experienced an overall decline of 18%.[6]

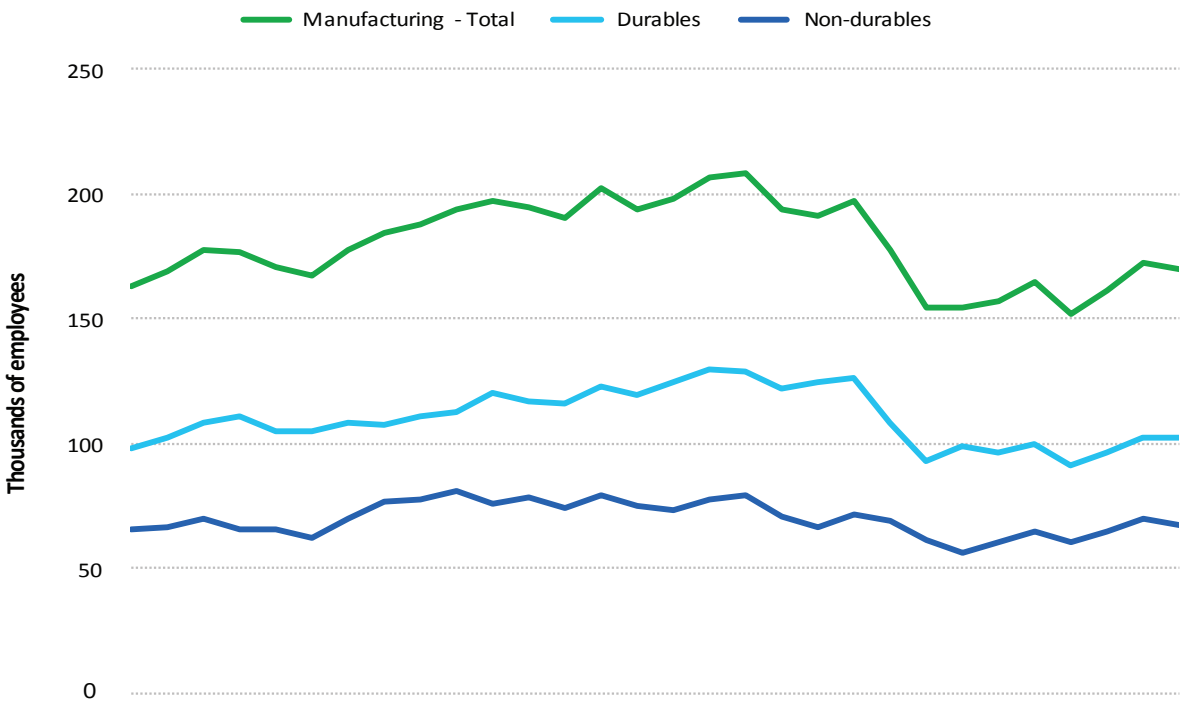
These trends suggest that the manufacturing sector is moving in the direction of higher value-added products through the more extensive use of new capital equipment. This is particularly noted in the BC Jobs Plan, which identifies advanced manufacturing (e.g., aerospace, ship building, pharmaceuticals, and medical equipment) as fast-growing.[7] This trend was also highlighted in KPMG's *Canadian Manufacturing Outlook 2016*. KPMG's survey of over 200 manufacturing executives across the country confirmed that 55% of respondents saw growth as their top strategic priority over the next two years.[8]

6 BC Stats. (2015). *A Profile of British Columbia's Manufacturing Sector.* Prepared for Ministry of Jobs, Tourism and Skills Training, 47, 51, 55.
7 BC Jobs Plan. *Sector Update: Advanced Manufacturing.* bcjobsplan.gov.bc.ca/app/uploads/sites/21/2017/02/Advanced-Manufacturing-1.pdf
8 KPMG. *Canadian Manufacturing Outlook* 2016. home.kpmg.com/ca/en/home/insights/2016/09/canadian-manufacturing-outlook-2016.html

2.2 The manufacturing workforce in BC

Figure 2 presents manufacturing employment trends since 1987. Total manufacturing employment peaked at 208,400 in 2004. Employment declined from 2004 to 2010, then began to slowly increase in recent years. However, there was a slight decline (1.3%) in manufacturing employment in 2016, while the sector's contribution to provincial GDP grew by 5.8%. These trends signal that increased productivity, growth and competitiveness in BC's manufacturing sector is now being achieved with relatively fewer workers.

Figure 2: Manufacturing employment, British Columbia, 1987 to 2016



Sources: Statistics Canada, CANSIM Table 282-0008. Labour force survey estimates (LFS), by North American Industry Classification System (NAICS), sex and age group, annual.

Looking at 2015 employment within the twenty-one 3-digit NAICS industry categories:

- Three sub-sectors (wood products, food, and fabricated metal) account for 45% of manufacturing employment in the province (Figure 3).
- Three other sub-sectors (paper, miscellaneous, chemicals) each account for just about 5% of the manufacturing workforce.
- The rest of the three digit NAICS employ relatively small workforces. In fact, 10 of the 21 NAICS employ 5,000 or fewer workers each.

Figure 3: Manufacturing employment by 3-digit NAICS, BC, number of workers and percentage of the total manufacturing workforce, 2015

	'000s	% of total
Wood Product Manufacturing	36.0	20.9%
Food Manufacturing	26.6	15.4%
Fabricated Metal Product Manufacturing	15.7	9.1%
Paper Manufacturing	10.1	5.9%
Miscellaneous Manufacturing	10.0	5.8%
Chemical Manufacturing	8.7	5.0%
Printing & Related Support Activities	8.5	4.9%
Transportation Equipment Manufacturing	8.2	4.8%
Machinery Manufacturing	7.9	4.6%
Computer & Electronic Product Manufacturing	7.2	4.2%
Beverage & Tobacco Product Manufacturing	6.4	3.7%
Non-Metallic Mineral Product Manufacturing	5.0	2.9%
Primary Metal Manufacturing	5.0	2.9%
Plastics & Rubber Products Manufacturing	4.8	2.8%
Other Transportation Equipment Manufacturing	4.3	2.5%
Motor Vehicle, Body, Trailer & Parts Manufacturing	3.9	2.3%
Furniture & Related Product Manufacturing	3.9	2.3%
Electrical Equipment, Appliance & Component Manufacturing	3.6	2.1%
Clothing & Leather & Allied Product Manufacturing	3.3	1.9%
Textile Mills & Textile Product Mills	x	--
Petroleum & Coal Products Manufacturing	x	--
Total Manufacturing	**172.5**	**100%**

Source: Statistics Canada, Labour Force Survey (unpublished data prepared by BC Stats June 2016).
Note: X denotes data suppressed to protect confidentiality, due to insufficient numbers.

Figure 4 shows the distribution of employment by business establishment (i.e., worksites). Just over three-quarters of the 7,271 manufacturing establishments or worksites in the province with employees at the end of 2016 have less than 20 employees. Only 2%, or 152, have 200 or more employees. However, when interpreting these numbers, it is important to keep in mind that one business can have multiple locations, which is true for about half of the firms included in the survey (see Appendix B3).

Figure 4: Establishments with employees, BC manufacturing (NAICS 31-33), December 2016

Employees	Number of establishments	%
Less than 20	5603	77.1%
20 to 49	951	13.1%
50 to 199	565	7.8%
200 plus	152	2.1%
Total	**7,271**	**100.0%**

Source: BCStats, Business counts and employment by industry.
bcstats.gov.bc.ca/StatisticsBySubject/BusinessIndustry/BusinessCountsEmploymentByIndustry.aspx

A complementary perspective on firm size is offered by the Survey of Employment, Payrolls and Hours (SEPH).[9] According to the SEPH, in 2015, 18.8% of manufacturing enterprises in BC employed less than 20 persons, 27.1% had workforces numbering between 20 and 99 and 54.1% employed 100 or more workers. The discrepancy between the SEPH numbers and those in Figure 4 reflect different classification units being used (i.e., establishments versus enterprises) and different size categories. Furthermore, the SEPH size categories fit those used by WorkSafeBC to regulate and report on workplace safety. For consistency with WorkSafeBC, this report defines small companies as those employing less than 20 workers, medium size as employing 20 to 99, and large as those employing 100 or more workers.

The SEPH defines an enterprise as a business organization consisting of one or more establishments, or worksites, in Canada under common ownership or control. Each multi-establishment company forms one enterprise.

9 Statistics Canada, CANSIM, Table 281-0042. Survey of Employment, Payrolls and Hours (SEPH), employment for all employees, by enterprise size and North American Industry Classification System (NAICS), annual.

It also is useful to know how the manufacturing workforce is distributed across firms of different sizes. While this information is not reported for BC, it is available for the national manufacturing workforce.[10] Manufacturing enterprises with fewer than 20 employees employ 12.4% of the sector's national workforce, and 22.7% work in medium-size establishments of 20 to 99 employees. In short, over half of all manufacturing workers (54.1%) are employed in large firms of 100 or more employees.

2.3 Manufacturing workforce demographics and trends

BC's future labour market will be influenced by two significant demographic trends: population aging and a declining supply of young workers. These trends have direct implications for manufacturing employers. The province's labour market scenario model has identified workforce aging as requiring succession planning and skills training, especially for senior managers.[11] *The BC 2025 Labour Market Outlook* predicted 52,000 job openings in manufacturing between 2016 and 2025, almost all of which are from retirements.[12]

The *National Manufacturing Labour Market Information Report* predicts that manufacturing across Canada could experience a significant 'recruitment gap.' This requires an additional labour supply from other regions or industries to meet the sector's labour requirements. This is because many of the sector's skilled trades and technical workers are expected to retire in the next decade.[13] Within BC, the Vancouver area's strong manufacturing growth could result in a recruitment gap of over 10,000 workers.[14]

Statistics Canada provides gender and age group breakdowns for the manufacturing sector in BC.[15] Over the 2000 to 2016 period, there was a small increase in female representation, from 24% in 2000 to 26.3% in 2016. Within manufacturing, durable goods firms employed relatively more females in 2016 (39.6%) than firms making non-durable goods (17.6%). A more significant shift occurred between 2000 and 2016 in the age composition of BC's manufacturing workforce. The proportion of the workforce age 55 and older increased from 12.3% to 22.8% over this period, while the proportion in the 15 to 24 age group increased far less (from 12.9% to 13.6% of the manufacturing workforce). This aging trend in the manufacturing sector parallels what is happening in the provincial workforce in this regard.

10 Statistics Canada. CANSIM, Table 281-0042. Employment, by enterprise size, Canada, 2015.
11 BCStats. (July 2010). *BC Labour Market Scenario Model. BC's Aging Workforce.*
12 *British Columbia 2025 Labour Market Outlook.* workbc.ca/getmedia/00de3b15-0551-4f70-9e6b-23ffb6c9cb86/LabourMarketOutlook.aspx
13 Canadian Manufacturers and Exporters and the Canadian Skills Training and Employment Coalition. (2015). *The Future of the Manufacturing Labour Force in Canada.* CME/CSTEC National Manufacturing Labour Market Information Report.
14 Ibid, p. 29.
15 Statistics Canada. CANSIM, Table 282-0008 - Labour force survey estimates (LFS), by North American Industry Classification System (NAICS), sex and age group, annual.

2.4 Workforce demographics of firms participating in the survey

The survey provides useful details on workforce demographics (Figure 5). Specifically:

- Two-thirds of the firms surveyed have a workforce that is 50% or more male. Women make up half or more of all workers in just 11% of firms and account for 25% to 49% of all workers in 27% of firms.
- Firms employ both younger and older workers. About 13% have 25% or more of their workers in the 16 to 24 age group, while 28% employ a similar proportion of older (55+) workers.
- Workers whose second language is English are common, with 18% reporting that this describes half or more of their workforce.
- Relatively few (less than one in four firms) use temporary foreign workers.
- A number of firms do not collect this information, suggesting that a labour market information gap exists for manufacturing workforce demographics.

Research confirms that the manufacturing sector will be affected by workforce-wide trends: an aging workforce, increased retirements and fewer young workers. One in four survey respondents is 55 years of age or older and about one in five are likely to retire in the next five years. About one in ten survey respondents reported that half or more of their workforce was age 55 or older. Most participating firms employ older (55+ years) more so than younger workers (Figure 5).

Focus group participants also highlighted workforce aging as a future OHS challenge. Retirement of experienced workers will increase the number of younger workers and immigrants recruited into the sector. This influx will increase the requirements for effective safety orientation and training for groups with little or no background in OHS.

Figure 5: Profile of workforce employed by respondents' firms in BC

Workforce characteristic	Percentage of workers				We don't collect this information (%)	Don't know (%)
	None	1-24%	25-49%	50% or more		
Males	0	4.6	13.9	65.7	8.8	6.9
Females	0	45.7	27.4	11.4	8.7	6.8
Age 16-24	2.4	63.5	10.0	3.3	12.3	8.5
Age 55+	0.9	48.6	19.1	9.1	12.7	9.5
Speak English as a second language	10.0	43.4	9.0	17.6	12.2	7.7
Temporary foreign workers	77.7	8.6	0.0	0.0	6.4	7.3

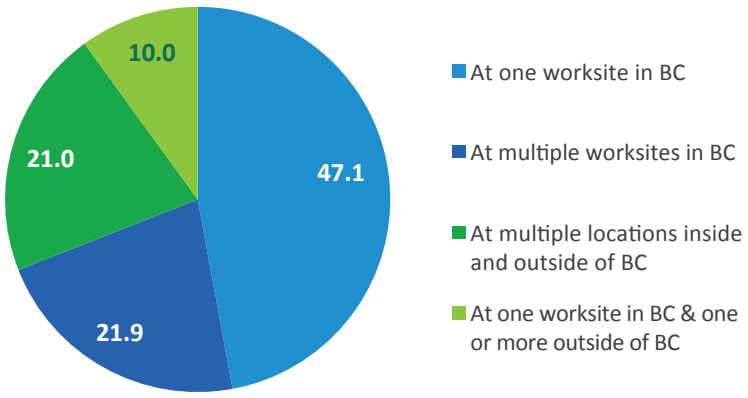
BC Stats projects that the province's labour force participation rate (a basic indicator of economic activity in the adult population) will decline from an actual rate of 64.1% in 2013 to 60.9% in 2027, ten years from now.[16] The decline in male labour force participation is projected to be even greater, resulting in increased competition for labour, which could affect manufacturing.

2.5 Profile of manufacturing companies surveyed

Manufacturing companies participating in the survey are differentiated by location, workforce characteristics, size and industry group (NAICS).

Just under half of the companies surveyed operate at one worksite in BC (Figure 6). Just over 20% of respondents' firms have multiple BC worksites, and an equivalent number operate at multiple locations inside and outside the province. One in 10 has one worksite in BC and one or more outside the province

Figure 6: Where respondents' companies operate



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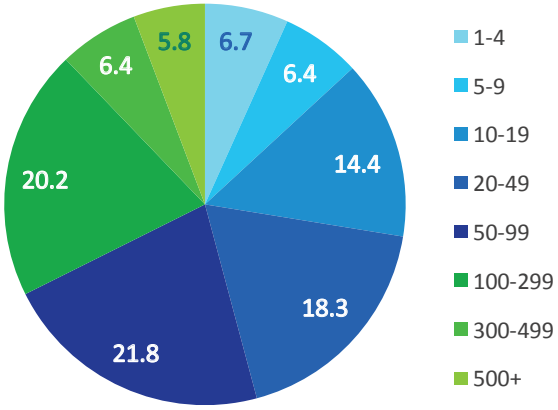
16 BC Stats. *Updated B.C. and Regional Labour Force Participation Rate Projections: 2014-2033.* bcstats.gov.bc.ca/StatisticsBySubject/LabourIncome/EmploymentUnemployment/LabourForceStatisticsAnnual.aspx

Using the WorkSafeBC classification for the size of participating firms in BC workforce, 27.5% are small firms (less than 20 employees), 40.1% are medium size (20-99 employees) and the rest (32.4%) are large (100 or more employees) (see Figure 7).

Figure 7: Total number of full-time and part-time employees in BC (%)



63% of the firms do not have unions in their BC workforce, while 20% have some unionized sites in BC, and another 17% have all unionized sites in BC (Figure 8).

Figure 8: Workforce unionization in respondents' firms

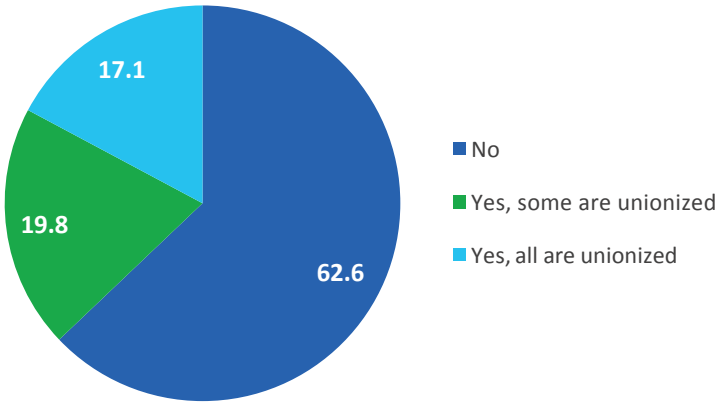
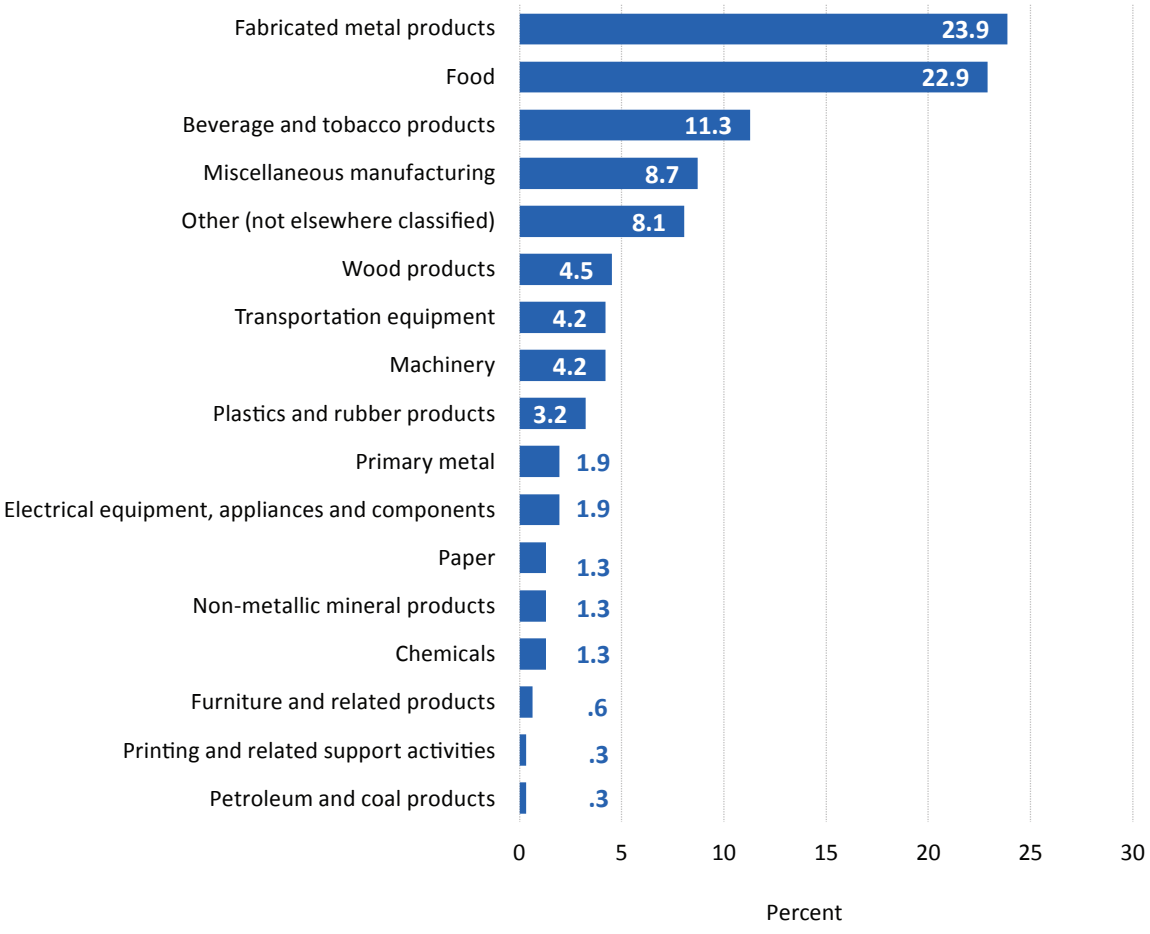


Figure 9 presents the industry groups included in the survey based on 3-digit North American Industrial Classification System (NAICS) groupings. The two largest industry groups are fabricated metal products (24%) and food manufacturing (23%). Beverage and tobacco production accounts for 11% of the firm sample, while wood products, transportation equipment, and machinery each account for about 4% of all firms surveyed.

The wide variety of firms sampled (as well as the difficulty some respondents may have had classifying their business according to the NAICS) is reflected in 9% of firms being in miscellaneous manufacturing. Another 8% were not classified by respondents (this number was initially higher, but some were placed into their appropriate NAICS category). There were also nine 'other' 3-digit NAICS represented, reflecting the wide range of industries included in the survey.

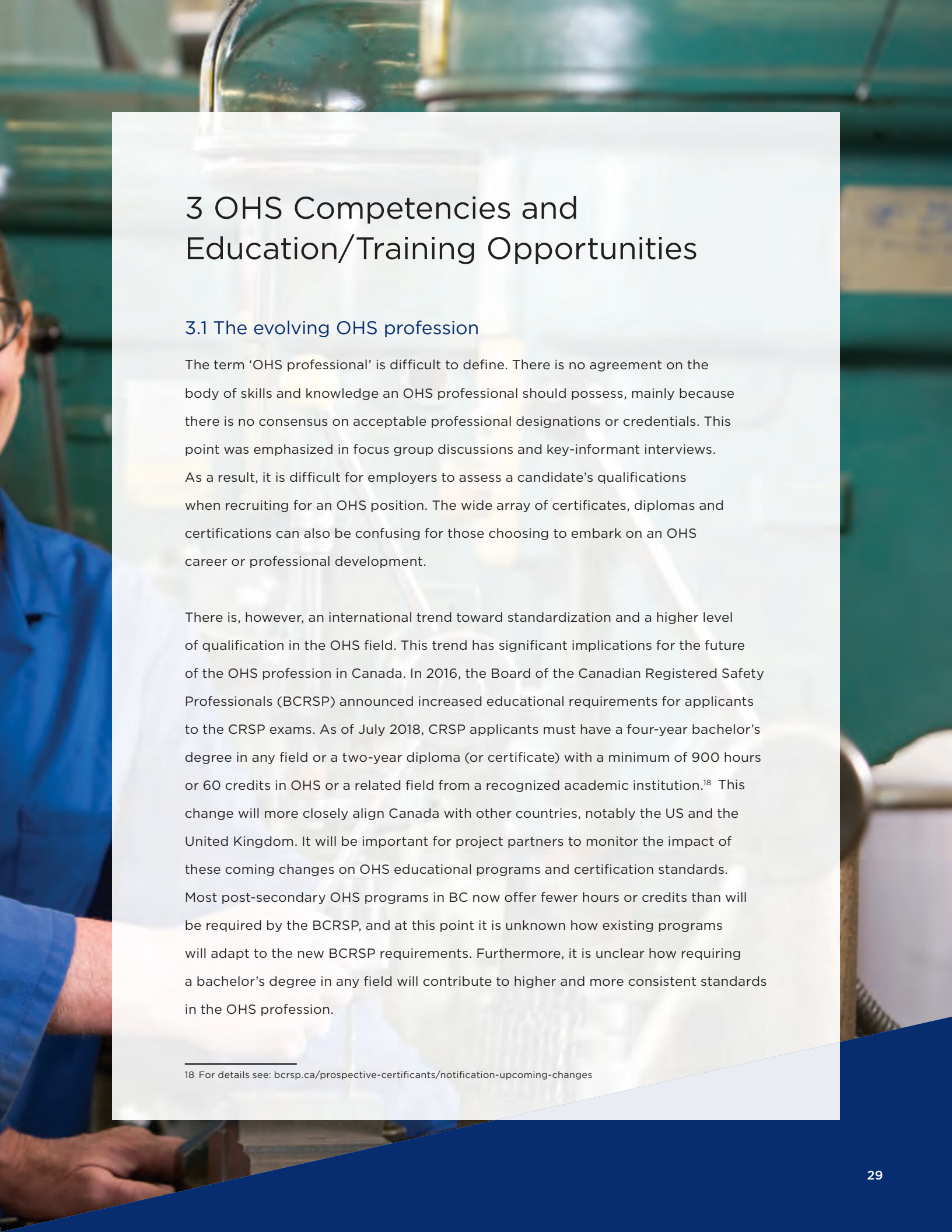
Figure 9: Survey respondents' industry group (3-digit NAICS)



2.6 Implications for OHS in manufacturing

- An aging workforce could create increasing OHS challenges for manufacturers. Growth in the sector will depend in part on employers' ability to maintain an adequate supply of workers, including OHS personnel.
- Firm growth could increase demands on employers to orient and train new workers on safe work practices.
- Because manufacturing jobs can be physically demanding, there could be limited opportunity to address labour shortages through delayed retirement of older workers. Effective succession planning would facilitate the transfer of OHS expertise from experienced to new workers.
- Competition for labour could increase pressure on manufacturing employers to expand the scope of their recruitment efforts to include groups such as women, immigrants and First Nations.
- Increasing workforce diversity may require new approaches to OHS training. This will include OHS training for workers who speak English as a second language and new approaches to learning such as online training and education programs.
- About one in five survey respondents believe their employees could benefit from OHS training in a language other than English. These numbers could increase in future as the workforce continues to become more culturally diverse.
- Many workers are employed in larger manufacturing firms, suggesting that targeting larger firms with OHS initiatives could reach a greater number of employees.
- Automated production processes have the potential to improve safety because of the training programs associated with new equipment, and by less human contact required with new technology.
- The presence of a union can contribute to improved OHS outcomes. Focus groups participants noted that OHS provisions can be included in collective agreements. Furthermore, union representatives alert management to emerging OHS problems and can play an active role on joint health and safety committees.[17]

17 Kelloway, E. K., Francis, L. (2011). *Management of Occupational Health and Safety.* 5th edition. Toronto, Nelson, 13.



3 OHS Competencies and Education/Training Opportunities

3.1 The evolving OHS profession

The term 'OHS professional' is difficult to define. There is no agreement on the body of skills and knowledge an OHS professional should possess, mainly because there is no consensus on acceptable professional designations or credentials. This point was emphasized in focus group discussions and key-informant interviews. As a result, it is difficult for employers to assess a candidate's qualifications when recruiting for an OHS position. The wide array of certificates, diplomas and certifications can also be confusing for those choosing to embark on an OHS career or professional development.

There is, however, an international trend toward standardization and a higher level of qualification in the OHS field. This trend has significant implications for the future of the OHS profession in Canada. In 2016, the Board of the Canadian Registered Safety Professionals (BCRSP) announced increased educational requirements for applicants to the CRSP exams. As of July 2018, CRSP applicants must have a four-year bachelor's degree in any field or a two-year diploma (or certificate) with a minimum of 900 hours or 60 credits in OHS or a related field from a recognized academic institution.[18] This change will more closely align Canada with other countries, notably the US and the United Kingdom. It will be important for project partners to monitor the impact of these coming changes on OHS educational programs and certification standards. Most post-secondary OHS programs in BC now offer fewer hours or credits than will be required by the BCRSP, and at this point it is unknown how existing programs will adapt to the new BCRSP requirements. Furthermore, it is unclear how requiring a bachelor's degree in any field will contribute to higher and more consistent standards in the OHS profession.

18 For details see: bcrsp.ca/prospective-certificants/notification-upcoming-changes

3.2 An international perspective on rising standards for OHS professionals

To understand the likely future direction of the OHS profession in Canada, and the issues that OHS associations and educational programs are now grappling with, it is useful to consider developments internationally. The following three examples are particularly relevant to this project:

3.2.1 The OHS 'Professional Capability Framework'

Research by the International Network of Safety & Health Practitioner Organizations (INSHPO) on the 'value proposition' for the OHS professional identified only two studies, both in the construction industry, with solid evidence of the value of OHS professionals, namely lower accident rates.[19] To address this gap, the INSHPO introduced an OHS Professional Capability Framework.

The Framework defines the role of OHS professionals and practitioners and establishes a high and uniform standard for required knowledge and skills. The goal of the Framework is to set out clear OHS competencies in order to "provide benchmarks for education and training bodies and OHS professional associations as they develop certification schemes, educational programs and continuing professional development." [20]

The Framework distinguishes between OHS professional and OHS practitioner roles. The former would be university-educated, hold management or director positions in OHS and be responsible for OHS strategy development. The latter would have 'vocational' education – which in Canada means a certificate from an OHS professional association or a college diploma or certificate – and would work as a frontline OHS officer, advisor or coordinator.

3.2.2 US research on OHS 'core competencies'

Perhaps the most comprehensive study of the OHS workforce was undertaken in the US on behalf of the US National Institute for Occupational Safety and Health.[21] The study assessed the supply and demand for OHS professionals in the US and identified the OHS professional competencies that employers require over the next 5 years.

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19 Borys, D. (2014). *The Value Proposition for the Occupational Health and Safety Professional Literature Review.* International Network of Safety & Health Practitioner Organisations (INSHPO). inshpo.org/docs/INSHPO_OSH_prof_lit_review_online_0914.pdf
A summary of the report was published in the Winter 2015 issue of the CSSE's *Canadian Journal of Occupational Health & Safety.*

20 International Network of Safety & Health Practitioner Organisations (INSHPO). (2016). *The OHS Professional Capability Framework: A Global Framework for Practice*. inshpo.org/work.php

21 McAdams, M.T., Kerwin, J.J., Olivo, V., & Goksel, H.A. (2011). *National Assessment of the Occupational Safety and Health Workforce.* Westat.

The results identified that employers expected to hire 25,000 OHS professionals during the 2011 to 2016 period, with over three-quarters of new hires requiring a university bachelor's level degree in OHS. Numerous US universities offer undergraduate OHS programs, which is not the case in Canada. In addition to OHS knowledge, employers wanted new OHS hires to have more leadership and communication competencies than current educational programs provided. Due to declining enrolment and reduced funding for university OHS programs, the study predicted a shortfall in the supply of OHS professionals. However, there has been no follow-up research to test this prediction.

The American Society of Safety Engineers (ASSE) surveyed its members to codify minimum OHS undergraduate degree program core competencies that would best meet employers' needs.[22] There are now over 186 OHS baccalaureate degree programs with 55 different titles and a wide range of content in the US In response to this proliferation of OHS programs, the ASSE recommended a standardized set of core competencies and evidence-based learning outcomes for all OHS programs. Included among these core competencies would be skills such as teamwork, organizational skills, ethics, critical thinking, scientific method, systems thinking, sustainability and strategic planning.[23]

3.2.3 Australia's 'OHS Body of Knowledge'

Also relevant to this project is Australia's success at defining core OHS knowledge and establishing consistent professional standards. In 2012, the newly-formed Australian OHS Accreditation Board implemented an accreditation system for university OHS programs.[24] As of 2016, 14 universities offered 29 accredited OHS professional education programs at the bachelors, graduate diploma (i.e., post-degree) and masters levels.

Accredited university programs that meet the standards can display the Accreditation logo on their websites and when promoting their program. This knowledge is codified in the OHS Body of Knowledge, which directly maps onto the INSHPO's OHS professional capability framework. Based on on-going evaluation by the Accreditation Board, it appears that accreditation based on a clearly defined body of knowledge has improved the consistency and quality of OHS professional education in Australia.

22 *Health Business Week.* (Sept. 25, 2015). American Society of Safety Engineers: ASSE's SeminarFest 2016 Offers Safety Professionals Opportunities to Grow Skillset.
23 Hartz, W.E. (2013). *21st-Century US Safety Professional Educational Standards: Establishing Minimum Baccalaureate Graduate Learning Outcomes for Emerging Occupational Health and Safety Professionals*. Ph.D. dissertation, Antioch University.
24 The Australian OHS Education Accreditation Board. ohseducationaccreditation.org.au/about-us

3.3 The Canadian OHS experience

There is a wide range of OHS competencies, standards, professional credentials, certifications and educational programs available in Canada. *OHS Canada* magazine estimates that there are between 200 and 300 designations in Canada in the occupational health, safety and environment area.[25]

Consequently, the quality of some qualifications is being questioned.[26] For example, there are some concerns about the voluntary COR (Certificate of Recognition) audits conducted on behalf of provincial workers' compensation agencies to certify that a company has implemented an OHS management system that exceeds minimum legislated requirements. Because auditors can have a wide variety of OHS designations, the COR auditing process may not provide the expected standardized level of quality assurance.[27]

This OHS landscape likely will change over the next five to ten years. Two OHS professional associations – the Canadian Society of Safety Engineers (CSSE) and BCRSP – are involved in international efforts, described above, to raise and standardize the core competencies and training programs for OHS professionals.

However, there is no research on the OHS professional workforce in Canada. Only one study has catalogued the OHS educational programs offered by Canadian post-secondary institutions.[28] The study confirmed that the majority of post-secondary OHS programs in Canada are at the certificate or diploma levels, not university degrees (unlike Australia or the US). The study did not examine the content of these programs in terms of consistency or standards. Certificate or diploma programs are especially suited to adult learners with work experience who want to upgrade their knowledge and skills to enter or advance in an OHS professional role. Focus groups and interviews for this project confirmed that relatively few students in these programs are young people seeking to enter OHS at the start of their career.

25 Putter. K. (March 4, 2015). Raising the bar. *OHS Canada.*
26 Ibid.
27 Researcher's interview with Todd Hall, Executive Director, Audit Canada. March 16, 2017.
28 Curran, V., Hayward, M., Bornstein, S., Del Bianco, et al. (2013). *Educational Offerings in Health and Safety in Canadian Post-Secondary Institutions: A Survey of Canadian Schools*. mun.ca/safetynet/projects/EducationalOfferings/OHS_Educational_Offerings_FINAL.pdf

3.4 OHS post-secondary education programs

Canada lacks a centralized, information source on the number of OHS practitioners and their types of OHS certifications and post-secondary credentials.[29] To address this information gap, post-secondary OHS programs in BC (listed in Figure 10) were contacted with requests for enrolment and graduation data and trends, as well as information on future plans for OHS certificate, diploma or degree programs. A detailed analysis of the actual content of these different OHS programs falls outside the objectives of this Sector LMP study. Rather, this is a crucial issue that needs to be addressed in future research if the OHS profession in BC (and across Canada) is to be based on a common body of knowledge.

Figure 10: Occupational Health & Safety Programs Offered by BC Post-Secondary Institutions

INSTITUTION	CREDENTIAL			FORMAT		
	Degree	Diploma	Certificate	Full-time	Part-time	On-line
British Columbia Institute of Technology (BCIT)		•	•	•	•	•
Okanagan College			•	•		•
Simon Fraser University (SFU)		•			•	
University of British Columbia (UBC)	**MSc PhD**			•	•	
University of Northern British Columbia (UNBC)			•	•	•	
University of Victoria (UVic)			•		•	•

All but one BC program responded to requests for information (Figure 11). Request for information on OHS program enrolments and graduation rates were also sent to appropriate ministries in the Alberta and Ontario governments but no response was received. Additionally, the University of New Brunswick would not release any information on its OHS programs for proprietary reasons.

29 ccohs.ca/oshanswers/information/courses.html

*Figure 11: Occupational Health & Safety Program Enrolment and Graduation Statistics**

Institution & Credential	Enrolment	Graduates	Employment Outcomes	Format Details	Plans
BCIT Diploma	24 admitted annually	Graduate 20-22 annually over the past 10 years	Limited information on employment outcomes, although program reports that some grads are employed in manufacturing	2-year full-time program combining classroom lectures and labs with field-work and worksite practicum	No changes or expansion planned
BCIT Certificate	250 enter the program annually	Graduate 50-60 annually	See above comments	Distance education, print-based with tutors, written exams. 45 course credits, usually completed over 1.5 to 5 years	Some courses transferable to the BCIT Diploma in OHS program
Okanagan College Certificate	23 enrolled in the first year the program was offered. Target enrolment for 2017 is 25	Only 1 graduating class so far, with 14 graduates (the others either moved or dropped out)	No information on employment outcomes or post-graduation professional designations obtained	On-line	This is a new program. Plan to review program to ensure it meets the new CRSP requirements
SFU Certificate	180 currently enrolled	25 graduates	No information on employment outcomes or post-graduation professional designations obtained	In-class	Program started in 2014. Plan to review program to ensure it meets the new CRSP requirements
UBC Post-graduate Degree	MSc enrollment, 1992-2016: 215	Total MSc graduates as of Nov. 2016: 183 (approximately 7 to 8 annually)	A 2013 survey of program graduates found 17% employed in industry, 26% with provincial governments/agencies	Classroom	Occupational Hygiene program started in 1992. PhD program ended in 2011. No plans for new programs or expansion.
UNBC	181 students enrolled 2010–17; 7 students enrolled 2016-17	111 graduates	No information on employment outcomes or post-graduation professional designations obtained	On-line	A diploma program will be launched in 2018 and will align with new CRSP requirements

* Based on information provided by program administrators at each post-secondary institution. Not all programs in Figure 10 provided this information.

The most detailed information was provided by UBC's program in Occupational and Environmental Hygiene. The intake for the MSc program from 1992 to 2016 was 215 students (42% male, 58% female). A total of 183 students had graduated by November 2016. There are no plans to expand the program.

UBC also surveyed its graduates in 2013 about competencies gained in the program, employment history, continuing education and demographics. There were 49 respondents. Of these, 37% had acquired a professional OHS certification after completing a master-level degree. Ten respondents had received a Certified Industrial Hygienist (CIH) certification; seven had a Canadian Registered Safety Professional (CRSP), and one had a Registered Occupational Hygienist (ROH) certification. Only 14% of graduates worked in the private sector.

In terms of other post-secondary OHS programs, focus group participants pointed out that the two-year BCIT Diploma Program has gained a solid reputation for training generalist OHS professionals.
The OHS Diploma Program Head provided the following program profile:

- Every fall the program accepts 22 domestic and 2 international applicants. There are approximately 60-80 applicants for the 24 positions in the program.
- 20 to 22 students graduate annually and the attrition rate is low.
- Graduates usually find OHS jobs within 3 to 6 months.
- Intake, graduation and employment outcomes have been consistent for the past 10 years.
- Students are trained as safety 'generalists' so employed in many industries including manufacturing.
- No changes to the existing program are currently planned.

BCIT also has an OHS certificate program, which requires five years of practical experience and high school graduation. Some of the certificate courses are transferrable to the diploma program.

Figure 11 summarizes the supply of OHS personnel who have received a post-secondary credential, based on information provided by BC post-secondary institutions. These programs graduate about 70 students annually. Since the programs began, there have been a total of 553 graduates. There is no indication, either from the institutions themselves or from focus groups and interviews, that graduates have difficulty finding appropriate work.

The project's primary research results show that OHS practitioners in BC's manufacturing sector typically have some combination of a post-secondary credential (most often a certificate or diploma) plus a professional certification and relevant work experience. The career path into OHS typically involves several years of industry work experience (not necessarily manufacturing), OHS experience on the job, and some combination of OHS credentials and certification. Given the emphasis on work experience, both in the survey and by focus groups, an OHS professional is, for many, a mid-career move rather than a career path pursued right out of high school, college or university.

Regarding future OHS program plans, the BC Ministry of Advanced Education requires programs to evaluate their offerings every 5 years. Any plans to change existing programs would likely be considered as part of this mandatory review cycle. If coordinated across all BC institutions offering OHS certificates and diplomas, these program reviews could help to establish consistent standards in OHS education and qualifications.

3.5 OHS professional certifications in Canada and BC

Within Canada and BC, there is a multitude of safety credentials, certifications and designations currently available to OHS practitioners. While the term 'designation' and 'certification' are used interchangeably, they describe a hierarchy of qualifications. A *credential* refers to a post-secondary certificate, diploma or degree program specializing in OHS. A Safety *certification* is a qualification provided by safety associations, such as BCRSP, that are based on specific educational requirements, practical experience, a competency exam, and on-going certification maintenance through professional development courses. A safety *designation* is a qualification acquired through the completion of one or more short courses, typically offered by industry or safety associations.[30] This is another indication of the lack of consensus on what defines an occupation health and safety professional in Canada.

OHS professionals with the following safety certifications are employed within Canadian industry. Their respective associations provided some information on the number of practicing professionals with the following OHS certifications:

CCPE	Canadian Certified Professional Ergonomist
CRSP	Canadian Registered Safety Professional
CHSC	Certified Health & Safety Consultant
CHSMA	Certified Health & Safety Management System Auditor
COHN	Certified Occupational Health Nurse (Canada)
NCSO	National Construction Safety Officer
ROH	Registered Occupational Hygienist
ROHT	Registered Occupational Hygiene Technologist

30 The definitions of certifications and designations are based on Canadian Society of Safety Engineers. (2015). *Hiring a Health and Safety Practitioner. A Guide for Employers and OH&S Practitioners.* cocabc.ca/wp-content/uploads/2015/05/CSSE-Hiring-a-Health-and-Safety-Practitioner.pdf

Based on membership information provided by the above associations, a more detailed description of each OHS certification is presented in Appendix E. The following points are particularly relevant to the OHS profession in BC:

- The CRSP certification is perhaps the most widely accepted OHS certification in Canada, often required by employers when recruiting for safety positions.
- There were 607 practicing CRSP-certified OHS professionals in BC as of January 2017, representing an increase of 10% since 2012.
- CRSP eligibility criteria are changing on July 01, 2018 to be in line with higher standards in the US, UK, Europe and Australia. This is expected to result in increased professional recognition and employment opportunities. However, its impact on post-secondary OHS certificate and diploma programs is difficult to predict at this point. It is unclear how requiring a university undergraduate degree in any field will improve an applicant's OHS knowledge and skill base. Unlike the US or Australia (as noted earlier), presently there are no specialized OHS undergraduate degree programs offered in Canada.[31]
- CRSP employment by industry, from a *2015 Salary Survey Report*, shows that in Western Canada in 2015, 5.7% of survey respondents (52 individuals) were working in manufacturing. This compares with 18.3% of respondents in Ontario and Quebec.[32]
- Registered Occupational Hygienist (ROH) is a relatively small OHS profession in Canada, focused on workplace health risks and hazards such as chemical, physical or biological agents that can cause cancer.
- A national survey in 2010 identified very few respondents employed in manufacturing.
- It is noteworthy that the Manufacturers Health and Safety Association in Alberta has offered its members seven 'how-to' occupational hygiene courses with content geared to manufacturing industries.[33]

31 Two Canadian undergraduate programs offer OHS options. Ryerson University offers an OHS option in its School of Occupational and Public Health's bachelor of applied science degree program. Cape Breton University's Bachelor of Health Sciences focuses on environmental public health, which includes OHS. Also notable, BCIT's undergraduate nursing degree specialty program in occupational health nursing currently is under review and not accepting applicants.

32 Board of Canadian Registered Safety Professionals. (October 2015). *Report on the 2015 Salary Survey.*

33 See presentation by Dan Clarke: .mhsa.ab.ca/files/april-updae/Clarke%20Cons%20%202016.pdf

3.6 Summary of OHS certifications

In summary, Figure 12 provides the number of OHS certifications in BC and nationally based on reports by the professional associations that administer these qualifications. While the information is incomplete, it may be the most accurate picture of the active members of the respective associations.

Overall, in BC there are 1,323 individuals with one of six OHS certifications and 9,913 individuals who have seven of these nationally. There are no comparable numbers for other provinces. A breakdown of the industries in which these individuals are employed is not available. However, evidence collected in this project suggests that the supply of individuals with OHS certifications in BC currently is adequate to meet manufacturing employers' demands.

Figure 12: Number of individuals with OHS certifications in BC and Canada

Certification	Number in BC	Number in Canada	Comments
Canadian Certified Professional Ergonomist (CCPE)	?	237	BC data not available
Canadian Registered Safety Professional (CRSP)	607	4,623	
Certified Health & Safety Consultant (CHSC)	659	4,205	
Certified Health & Safety Management System Auditor (CHSMA)	3	35	
Certified Occupational Health Nurse (Canada) (COHN)	20	462	National data does not include Ontario, Quebec, PEI or the territories.
Registered Occupational Hygienist (ROH)	27	283	
Registered Occupational Hygiene Technologist (ROHT)	7	68	
TOTALS	**1,323**	**9,913**	

Source: Data provided in response to email requests by the researcher or available in association publications on-line.

3.7 Qualifications required for different OHS roles

There is little documentation of the education, experience and credentials required for various OHS roles with different levels of responsibility in organizations. However, in an effort to standardize these elements, the Canadian Society of Safety Engineers (CSSE) provides an overview of OHS practitioner levels as part of its employer guide to hiring an OHS practitioner.[34]

The CSSE summarizes education and certification requirements for OHS practitioners at four levels of responsibility: entry level; intermediate level; managerial level; and director or executive level. Entry level positions require high school and enrolment (not graduation) in an OHS certificate, diploma or degree program along with completed OHS training and education courses. Intermediate and managerial positions require an OHS diploma or certificate from an accredited college or university or a recognized industry-specific certification from a national or provincial safety association. Only the director or executive level requires a university degree.

These educational requirements suggest that it is possible for someone to progress in an OHS career with an OHS diploma, certificate or professional certification. Focus groups and key informant interviewees pointed out the need for this sort of career path in order to attract new entrants, especially younger workers, to the OHS field in future.

Additional information on the employment situations of OHS professionals is available from the 2015 members' salary survey conducted by the Board of the Canadian Registered Safety Professionals.[35] Ten percent of survey respondents (n=168) were based in BC. This suggests that BC employers have access to a much smaller pool of CRSP-certified OHS professionals than their counterparts in Alberta and Ontario. Only 5.7% of the CRSP survey respondents based in western Canada work in manufacturing (26% are in petroleum). Across Canada, 52% of respondents reported salaries above $100,000; salaries were even higher in the western region. Nationally, 90% of respondents were satisfied or very satisfied with their OHS career.

34 Canadian Society of Safety Engineers. (2015). *Hiring a Health and Safety Practitioner*, 49-52. cocabc.ca/wp-content/uploads/2015/05/CSSE-Hiring-a-Health-and-Safety-Practitioner.pdf

35 Board of the Canadian Registered Safety Professionals. (2015). *Report on the 2015 Salary Survey*. bcrsp.ca/sites/default/files/2015%20Salary%20Survey%20Report.pdf

The CRSP salary survey provides a snapshot of these OHS professionals employed in manufacturing nationally (numbers are too small for a regional breakdown). Of those employed in manufacturing, 29% had a college OHS diploma, 28% a university degree in a field other than OHS, 25% a university OHS degree, and 6% another credential from a college (the remainder had other unspecified education). Most CRSPs in manufacturing supervise no or a few OHS employees. And they typically work in large firms, with 60% employed in firms with 500 or more employees.

Only 42% of respondents employed in manufacturing reported that the CRSP was a job requirement. This is consistent with this project's research finding that no specific OHS professional qualification is considered essential for an OHS role in manufacturing.

3.8 Other opportunities for post-secondary OHS education

There are opportunities to provide more OHS education in apprenticeships and several university degree programs.

Several OHS practitioners who participated in focus groups started their careers in a skilled trade, moving into an OHS position mid-career. For these OHS practitioners, their skilled trade background gave them credibility with production workers regarding OHS issues. They noted that apprenticeships provide trade-relevant safety knowledge.

This observation raises the possibility that apprenticeships could potentially provide more background in OHS so that skilled trade workers could be 'safety champions' on worksites. Ten of 22 registered apprenticeship program graduates in BC could be employed in manufacturing, either in direct production or support (e.g., maintenance and service) roles. A total of 5,502 apprentices graduated in 2014. As focus group participants emphasized, OHS training in an apprenticeship is another source of OHS expertise for manufacturing employers that should not be overlooked.

The only Canadian study, cited above, to look at OHS educational programs in Canadian post-secondary institutions makes a similar point.[36] The study points out that minimal OHS education is included in university engineering, business, nursing or medicine programs. The same could be said of college programs in these disciplines. Graduates from these professions are in organizational positions that could positively influence safety practices and performance. The report recommends that this deficiency be addressed through the development of additional OHS courses and programs.

3.9 Labour market mobility

Geographic mobility is an important feature of a dynamic labour market. Inter-provincial and intra-provincial labour mobility is one way that job seekers find suitable employment. While there is no information available on the mobility of OHS professionals or graduates from BC OHS diploma and certificate programs, there are several general observations that have a bearing on this topic.

A point raised in several focus groups is that since the downturn in the Alberta oil and gas sector, trained OHS professionals from the sector have been looking for work in BC. Focus group participants expressed concern that these workers would return to higher-paying jobs in Alberta if oil prices rise. Less concern was voiced about the relevance of oil and gas experience to a manufacturing setting. More generally, focus groups suggested that work experience in a wide range of industries or trades can be helpful for someone entering an OHS position in manufacturing.

This focus group discussion raises more general issues about worker mobility. The 2014 BC Student Outcomes surveys of graduates in baccalaureate, diploma, associate degree, and certificate and apprenticeship programs tracked geographic mobility after graduation. After leaving their diploma programs, 13 percent of respondents moved from their study region.[37] By region, this ranged from 7% of students graduating with diplomas on Vancouver Island and the coast, to 20% in the southern interior.

How this mobility trend varies across programs is unknown. However, in general terms, it suggests that some diploma graduates are prepared to move for jobs. The demographic profile of OHS diploma graduates could reduce this option given that, at least based on focus group members' experiences, this education was acquired mid-career at a time in life when a move is more difficult.

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36 Curran, V., Hayward, M., Bornstein, S., Del Bianco, et al. (2013). *Educational Offerings in Health and Safety in Canadian Post-Secondary Institutions: A Survey of Canadian Schools*.

37 BC Student Outcomes Factsheet: *Moving On: The Mobility of Former Post-Secondary Students*. outcomes.bcstats.gov.bc.ca/Publications/AboutPublications.aspx

3.10 Summary

- The term 'OHS professional' is difficult to define. There is no consensus on the body of skills and knowledge, professional designations or credentials required to be an OHS professional in Canada. No specific OHS professional qualification is considered essential for an OHS role in manufacturing.
- There is an international trend toward the standardization at a higher level of OHS credentials and requisite education, skills and knowledge. In response, the Board of the Canadian Registered Safety Professionals (BCRSP) has increased the educational requirements for CRSP applicants starting in July 2018. It will be important for project partners to monitor the influence this change on the OHS education and certification landscape in BC over the next few years, looking for opportunities to establish consistent standards in OHS education and certification.
- The INSHPO's OHS Professional Capability Framework will provide a benchmark for the BC manufacturing sector if it moves forward to develop new certifications and training programs. The CSSE has been involved in this initiative, so it may be a resource in this regard.
- Competencies identified for OHS professionals, in additional to formal education and certifications, include leadership, communications, teamwork, organizational skills, ethics, critical thinking, internship experience, scientific method, systems thinking, sustainability and strategic planning. Efforts to standardize OHS qualifications and educational curriculum in BC should incorporate soft skills. Most post-secondary OHS programs in Canada are at the certificate or diploma levels, mostly geared to adult learners who want to enter or advance in an OHS professional role. In BC's manufacturing sector, a common path into the OHS profession is through a mid-career move, rather than right out of school.
- Numerous OHS credentials, certifications and educational programs are available in Canada. Consequently, it is difficult for employers to accurately evaluate the qualifications of applicants for OHS positions. The lack of a centralized database that documents the number of OHS practitioners and their OHS certifications and post-secondary credentials constitutes a significant labour market information gap.

- OHS post-secondary educational programs in BC graduate about 70 students annually. While there are some indications that program graduates are able to find suitable work, a more definitive assessment of these labour market outcomes is required. OHS practitioners in BC's manufacturing sector typically have some combination of a post-secondary certificate or diploma, plus a professional certification and relevant work experience.
- There are 1,323 individuals located in BC with one of six recognized OHS certifications. Project evidence suggests that this supply of individuals with OHS certifications in BC currently is adequate to meet manufacturing employers' demands. In BC's manufacturing sector, a common path into the OHS profession is through a mid-career move, rather than right out of high school, college of university. This finding suggests that employers prefer workers in OHS positions to have a blend of manufacturing or other relevant work experience and OHS education. However, future research is required to understand the ideal combination of experience, skills and education required in order for OHS professionals to meet the needs of BC manufacturers.
- There are opportunities to increase the level of OHS expertise among students in university or college engineering, business and nursing programs through the development of required OHS courses.

4 The OHS Workforce in Firms Surveyed

> ***This section uses survey results to document the OHS workforce in BC manufacturing. Topics include the qualifications, roles and responsibilities of OHS personnel; firms' OHS recruitment, development and retention experiences; the qualifications firms seek in OHS personnel; variations in the use of OHS personnel by firm characteristics; and the qualifications of OHS personnel working in BC manufacturing firms.***

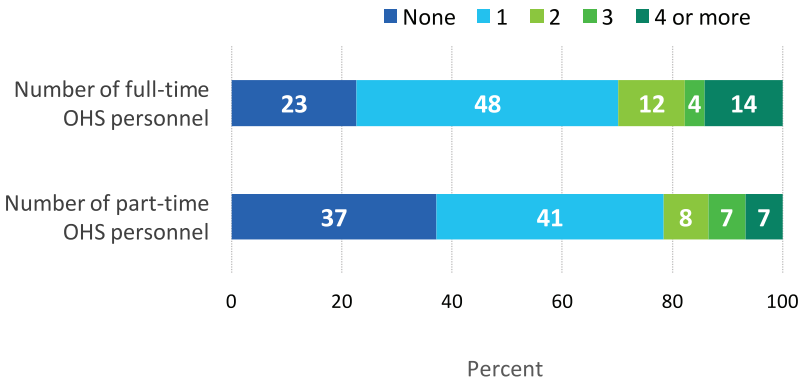
4.1 Qualifications, roles and responsibilities

The survey conducted for this project provides the most detailed assessment available of the OHS workforce in BC's manufacturing sector. Close to one in three survey respondents are in OHS positions, either as safety managers or OHS/HSE advisors, coordinators or specialists, and 8% are HR managers, which highlights the role of this profession in workplace safety. About one in five respondents spend between half and three-quarters of their week dealing with OHS issues (for a more complete respondent profile see Appendix B).

The survey provided respondents with a limited number of general OHS job titles from which to select. Focus group participants also offered details on the wide range of job titles and positions with OHS responsibilities. While all participants had direct OHS responsibilities, their job titles included safety coordinator, HSE (health, safety and environment) manager, safety advisor, safety manager, operations manager, plant managers, VP operations, shop supervisor, OHS committee representative, EHS (environment, health and safety) advisor, quality control manager, and quality and safety manager. Focus group participants made it quite clear that they do not like the label 'safety officer' because they don't want to be viewed as enforcers – or what they referred to as 'safety police'.

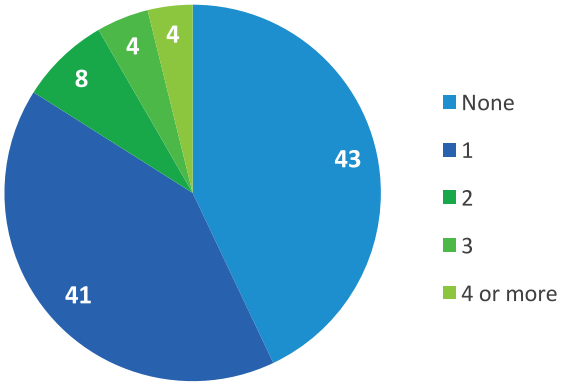
Over half (59%) of survey respondents reported that their company employs someone in a full-time or part-time OHS position (including themselves). In companies with OHS personnel, about half (48%) employ one full-time OHS worker (Figure 13), while 30% employ two or more full-time OHS personnel. Less than half (41%) have one part-time OHS worker, while 22% have two or more in part-time OHS positions.

Figure 13: OHS personnel employed by respondents' firms (%)



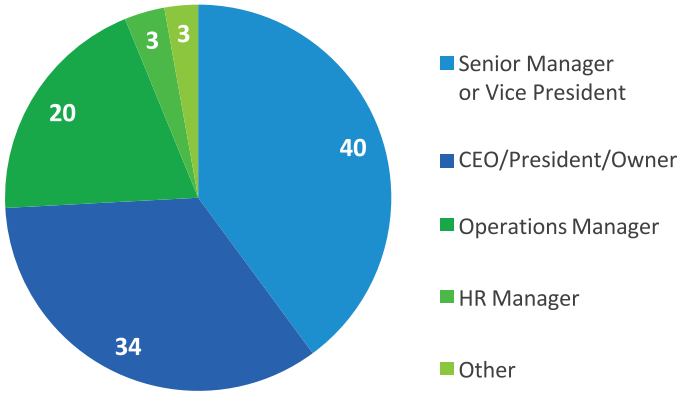
Regarding the professional qualifications of these OHS workers, 43% have none and another 41% have one such qualification (Figure 14). Few (16%) have more than one professional qualification.

Figure 14:OHS workers' professional qualifications (%)



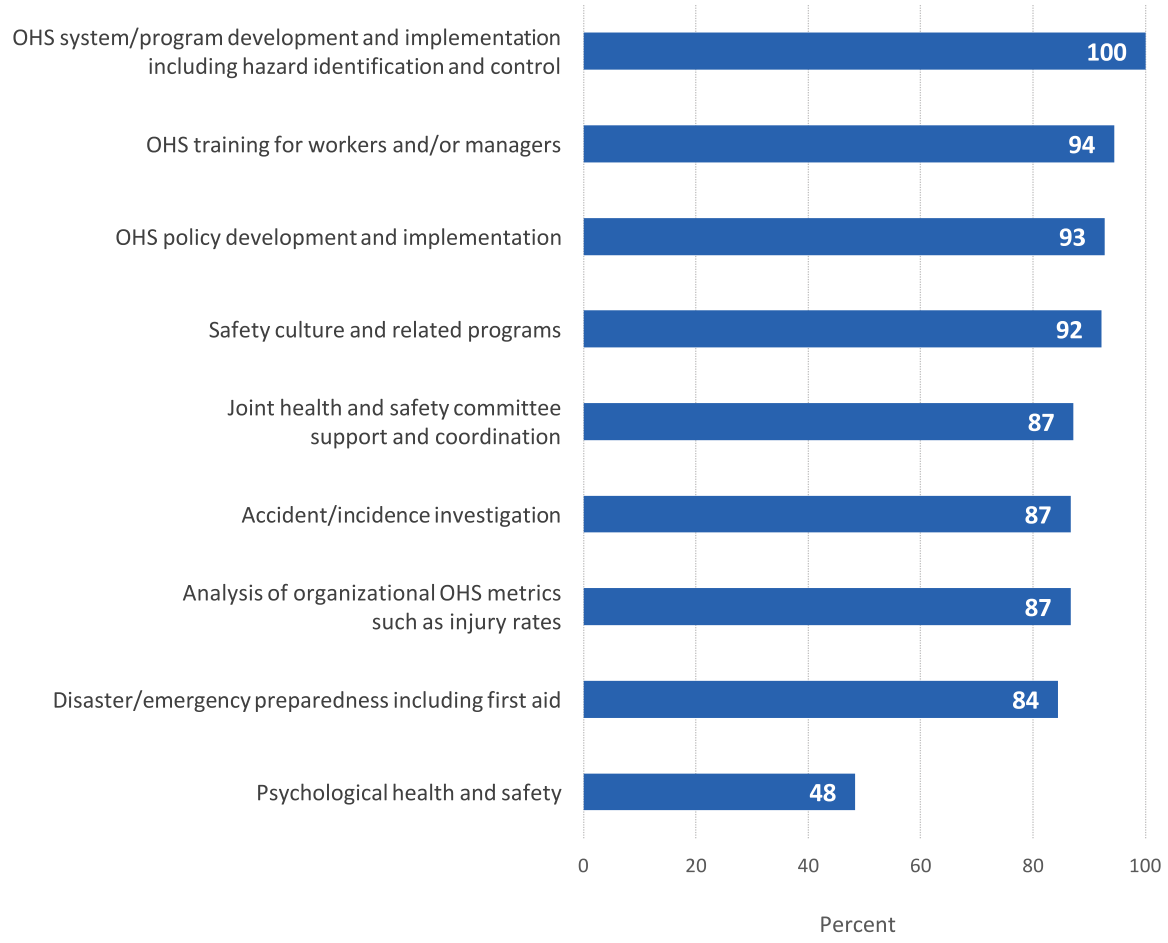
Most workers with direct responsibility for OHS either report to a senior manager or vice president (40%), or to the CEO, president or owner (34%). One in five reports to the operations manager, while very few (3%) report to a human resources manager (Figure 15).

Figure 15:To whom the most senior OHS worker reports (%)



OHS personnel provide a wide range of support within their workplaces (Figure 16). All of them are responsible for OHS system development and implementation, including hazard identification and control. Over 90% provide OHS training, OHS policy development and implementation, and safety culture support. Around 85% support a joint health and safety committee, investigate accidents and incidents, analyze OHS metrics, and provide emergency preparedness, including first aid.

Figure 16: Types of support provided by OHS personnel



Just under half (48%) address psychological health and safety as part of their role. This finding reflects the growing interest among all types of employers across Canada in promoting workplace mental health.[38]

38 Samra, J. (2017). *The Evolution of Workplace Mental Health in Canada: Research Report* (2007-2017). workplacestrategiesformentalhealth.com/pdf/Evolution_Research_Project_Full_Report__Jan_2017_0.pdf

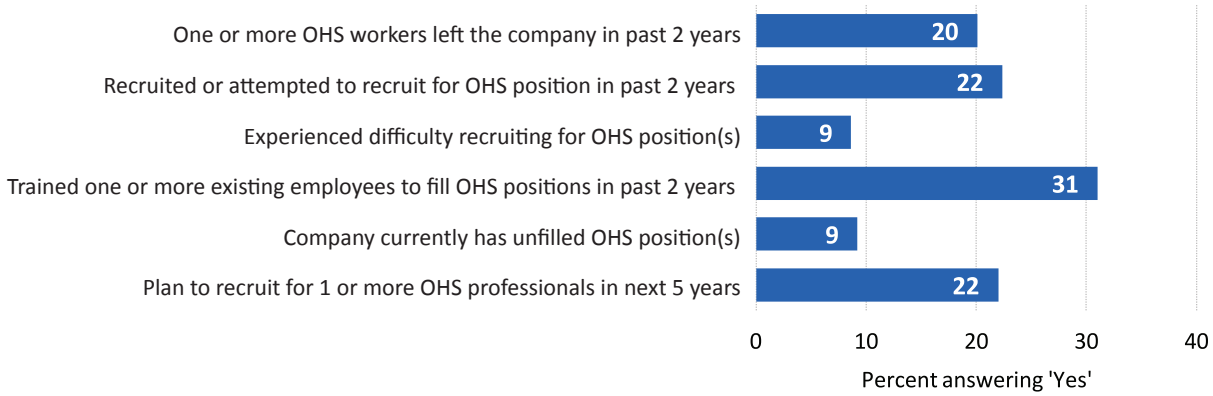
4.2 Recruitment, development and retention of OHS personnel

Slightly more than one in five firms in the survey recruited or attempted to recruit for an OHS position in the past two years (Figure 17). One in five respondents reported that an OHS worker had left their company in that time period, which helps to explain this recruitment activity.

Of those firms that recruited, only 9% experienced difficulty in this regard. Internal development of OHS expertise is more common than external recruitment, given that 31% of companies trained an existing employee to fill an OHS position in the past two years. This interesting finding raises important questions for future research. Specifically, why do companies pursue this internal development strategy for OHS expertise? And do firms that have internally developed OHS personnel differ in their safety performance from other firms that externally recruited for OHS roles? At the time of the survey, 9% of firms had an unfilled OHS position, and 22% plan to recruit one or more OHS professionals in the next five years.

Because so little is known about the labour market for OHS professionals in Canada, there are no benchmarks against which to compare recruitment and development activity. However, these findings suggest a reasonably active labour market with between 20% and 30% of manufacturing firms in our survey engaged in recruitment or internal development of OHS personnel.

Figure 17: Recruitment, development and retention of OHS personnel



Most firms (91%) recruited for an OHS position within BC within the past two years (Figure 18). Just under half (48%) required applicants to have an average of three years of manufacturing work experience.

Looking at the one in five respondents who reported that an OHS worker had left their company in the past two years, most (80%) knew the reason for this departure. The two most common reasons were that the OHS worker was dismissed (44%) or left for another job (42%). Note that only 4% of departures were retirements. Equally interesting, very few (2%) of departing OHS workers were returning to school for further OHS education. Focus group discussions suggested that it is not uncommon for firms to recruit someone for an OHS position who either lacked adequate qualifications or does not fit into the company, resulting in dismissal.

The fact that 'dismissed' was the most common reason raises the possibility that these particular OHS workers may have lacked the skills, experience or professional training required to perform their jobs well. However, this is speculation because the survey did not ask why OHS workers were dismissed. This topic deserves further study, focusing specifically on identifying the competencies required for workers to be effective in an OHS role.

Figure 18: Recruitment and retention of OHS personnel in firms surveyed

Percent of companies recruiting for an OHS position(s) in past 2 years that:		
	Recruited in BC	91%
	Recruited in other provinces	42%
	Recruited internationally	7.5%
Of companies recruiting for an OHS position(s) in past 2 years:		
	Percent requiring applicants to have manufacturing work experience	48%
	Average number of years of manufacturing work experience required	3 years
Percent of companies where 1 or more OHS workers departed in past 2 years:		
	Who know why these OHS workers left the firm	80%
Reason why OHS workers left:		
	Dismissed	44%
	Left for another job opportunity	42%
	Moved	6%
	Retired	4%
	Returned to school for OHS education	2%

Figure 19: Most important qualification companies would look for if recruiting for an OHS position today

Theme	(n)	%	Examples of typical responses	
OHS knowledge, skills, abilities	31	16.7%	Ability to train and handle incidents as they occur.	Thorough knowledge of safety regulations; ability to conduct safety related training to employees; organizational skills.
Experience in an OHS role	27	14.5%	Experience in practical application of safety measures and good ability to train and seek compliance amongst all staff.	Experience in managing a successful OHS program.
Work experience (not specified)	17	9.1%	Experience.	Work experience.
Industry-specific experience, knowledge	13	7.0%	Experience in our industry and the use of fabrication equipment.	Successful experience working in a manufacturing environment with seasoned Journeymen.
Non-OHS knowledge, skills, abilities	13	7.0%	Ability to perform other useful tasks... a full time OHS person is not required.	Ability to do other work.
OHS certification plus manufacturing experience	12	6.5%	Minimum CRSP with 5 years' experience in an industrial environment.	Minimum CSO certification with good solid experience 3 years or more and level 3 first aid certification.
OHS certification/ credential (not specified)	12	6.5%	OHS certificate.	Safety-specific post-secondary education - 2 year program adequate.
Attitude	12	6.5%	A desire to make a difference - a safety champion.	A person who is passionate about safety and wants to continue doing safety for long term.
OHS experience in manufacturing	9	4.8%	Experience in Health & Safety in a manufacturing field and the ability to work constructively with Management and Operations.	At least 3 years OHS experience in manufacturing and be familiar with OHS management systems.
Team player/good working with others	9	4.8%	Team worker looking for the safety of the employees as a priority.	Being able to successfully interact with Senior Management and Supervisors in order to push through and follow through with unpopular initiatives.
OHS education and experience	7	3.8%	Safety certification and experience as a tradesman.	OHS diploma or certificate with previous full-time safety position experience.
CRSP	7	3.8%	CRSP.	CRSP, experience with Operations Management and OHS.
Education (not specifically OHS)	6	3.2%	Education and Training.	Education background, applying methods and leading people to change behaviour.
Communication skills	4	2.2%	Communication - ability to effectively communicate safety regulations in a way that employees "listen" and "understand."	Good communication and interpersonal skills.
Other	4	2.2%	Our company is relatively small and will not be hiring for an OHS employee.	Would fill from within.
TOTAL	**183**	**100%**		

4.3 OHS qualifications manufacturing firms look for when recruiting

Respondents were asked to describe the most important qualification their company would look for if recruiting for an OHS position today. A thematic analysis of these open-ended responses is presented in Figure 19. The first thing to note is the diversity of "most important" requirements. There are 14 specific themes mentioned by the 183 respondents who answered this question.

The two most common responses were general OHS knowledge, skills and abilities (16.7%) and experience in an OHS role (14.5). Manufacturing industry experience was considered most important by only 7% of respondents, while another 6.5% mentioned a combination of an OHS certification plus manufacturing experience, and a smaller group (4.8%) would look for OHS experience in manufacturing.

Few companies would emphasize non-OHS skills and abilities. For example, about 5% would give priority to candidates with good team work skills, while 2% would emphasize good communication skills. Note that the survey question specified the "most important" qualification. In more wide-ranging discussions of OHS qualifications, the focus groups did emphasize the importance of soft skills in addition to OHS knowledge and experience.

Finally, it is interesting to see that very few (3.8%) respondents mentioned a specific OHS credential (e.g., a CRSP) as the most important job requirement. As pointed out in focus groups and interviews, this could reflect the difficulty employers face trying to identify a specific credential relevant to their needs, given that there are many credentials and no common standard for comparing them. It could also reflect a lack of knowledge about these OHS credentials among managers or HR personnel who are not familiar with the OHS field.

The survey also asked those respondents whose companies had actually recruited for an OHS position in the past two years to describe the minimum requirements for the job (Figure 20). Among companies that had recruited for an OHS position, few emphasized manufacturing work experience. More emphasis was placed on OHS qualifications, including CRSP or CSO designations or an OHS diploma or degree. However, it is important to note that CRSP and CSO designations have very different requirements. Specifically, a CRSP-certified OHS professional often has a 2-year OHS college diploma and has passed a rigorous exam, while the CSO designation involves passing a two week training program.

*Figure 20: Minimum qualifications required by firms recruiting for an OHS position, 2015-16**

THEME (n)	EXAMPLES
OHS certificate (16)	CRSP, CSO
	OHS Certificate
Experience plus OHS education and/or certification (8)	3-5 years in a safety manager role. Some professional designation or post-secondary education in safety (CRSP, OHS diploma, etc.).
	Depends on position level; however, typically a combination of work experience, secondary education in health and safety and/or safety designation.
OHS diploma (8)	Manager, OHS requires OHS diploma; Coordinator requires experience in industry.
	Diploma/Certificate from a recognized educational institution, CRSP.
OHS experience/knowledge (6)	Nothing is required but we try to get applicants with experience in H&S, COR and OSSE experience, certification in equipment required for normal work and some secondary schooling.
	Knowledge of OHS regulations.
2-5 years OHS experience (5)	5 years of experience in an OHS role, level 2 first aid, COR experience.
	Minimum 2-5 years of experience in an OHS position. COR management experience.
University degree (3)	Degree or diploma in Occupational Health and Safety or equivalent.
OHS plus manufacturing experience (2)	Experience in OHS and industry experience.
	Experience working in a manufacturing environment with a formal health and safety program and a strong safety culture. Formal OHS training an asset.
OHS experience and multiple other skills (1)	10 years overall OHS experience, union experience, claims management experience, good organizational skills, time management skills, computer skills, COR audit experience, statistical analysis experience, etc. We are not so much concerned with a person having a designation as we are with having great practical skills.
Manufacturing experience (1)	Manufacturing experience.

* This table reports a thematic analysis of 55 responses to an open-ended question, asked of those respondents whose companies had recruited for an OHS position in 2015 or 2016: "*Please briefly describe the MINIMUM OHS qualifications you required.*" The number of responses in each theme is in brackets. Examples provided are verbatim comments.

Figure 21 summarizes the main recruitment difficulties faced by those firms that recruited for an OHS position in the past 2 years. A lack of qualified safety professionals stands out as the main barrier to recruitment. Very few respondents to this question mentioned pay expectations as a recruitment barrier.

*Figure 21: Briefly describe the MAIN recruitment difficulty your company experienced.**

Finding competent, experienced, qualified safety professionals (11)	No one applied.	Not many junior level candidates with OHS knowledge.
Applicants lacked required OHS credentials and experience (4)	CRSP designation was not evident amongst applicants. Also, a broad QHSE competency, specifically finding Quality and Food safety including HACCP, along with safety and environment experience was a challenge.	Competent and experienced safety officers are difficult to find. Qualifications play a secondary role when hiring at... as experience in OHS matters is more vital to the type of work carried out by our workers.
Pay expectations (4)	Wage expectations, experience. Didn't find anybody local with the right background.	People with formal credentials wanted more than we were willing to pay. Hard to find people who are not pursuing a formal OHS career to be interested in taking on a safety role.
Lack of qualified, interested BC applicants (2)	Lack of BC candidates; too any construction/AB applicants - they will go back to oilfield once it's up and running again; lack of manufacturing experience; no knowledge of food processing - link of employee safety to food safety; lack of credentials.	Level of expertise for candidates interested in the position was low in BC.
Finding right combination of education and experience (2)	Educated AND experienced are hard to find.	Lack of experience. Lack of formal education.
Finding industry-specific experience (1)	Food Manufacturing experience.	
Finding the right cultural fit (1)	The right fit culturally.	

* This table reports a thematic analysis of 24 responses to an open-ended question: "*Please briefly describe the MAIN recruitment difficulty your company faced*." Only respondents whose companies had experienced difficulty recruiting for an OHS position in the past two years (2015 and 2016) were asked this question. The number of responses in each theme is in brackets. Examples provided are verbatim comments.

4.4 Variations in use of OHS personnel by firm characteristics

The survey results provide an opportunity to examine how firms differ in their use of OHS personnel and their experiences recruiting and retaining such workers. This section reports workforce size and regional differences on these important dimensions. The analysis used the WorkSafeBC size classification of small (fewer than 20 employees), medium (20 to 99 employees) and large (100 or more employees). The key insight is that workforce size is far more important for understanding OHS issues than regional location or industry sub-sector (NAICS).

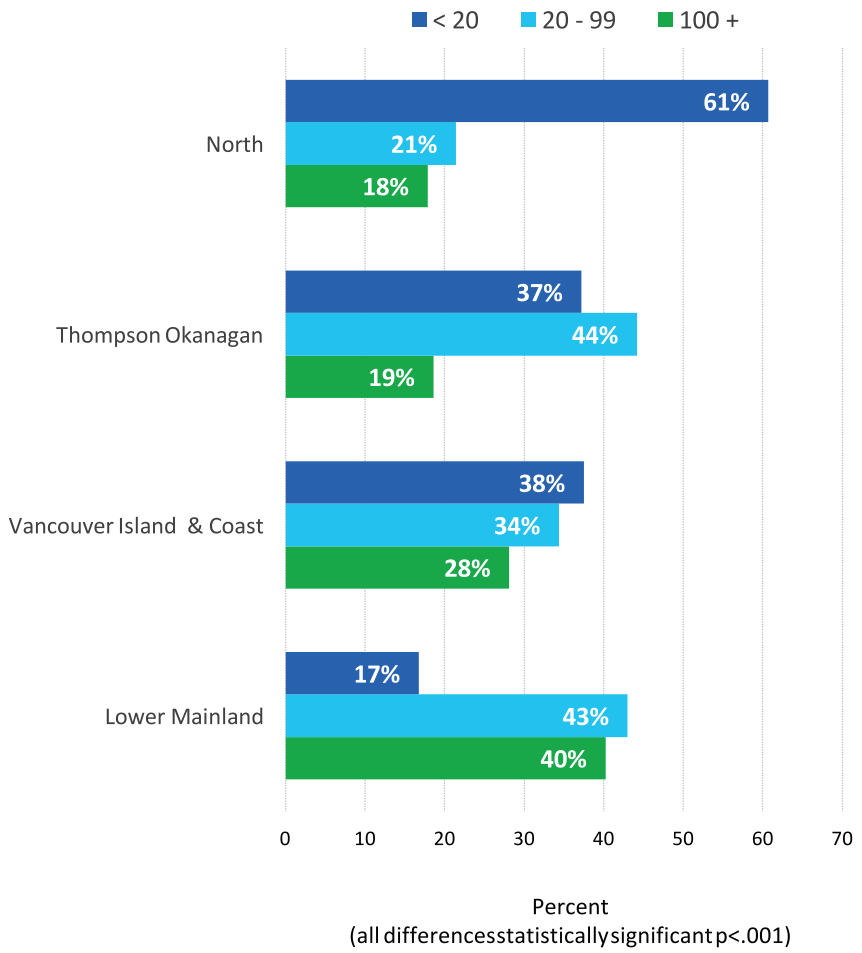
Considering first the industrial distribution (NAICS) of firms by workforce size, small and medium firms are concentrated in metal fabrication, food processing, beverage and tobacco, and miscellaneous manufacturing. The NAICS distribution of large firms is slightly different. A higher proportion is in food processing, somewhat less in metal fabrication, beverage and tobacco, and a more even distribution occurs across other NAICS. Because firms in the survey were spread across 17 NAICS, the relatively small sample size did not permit a detailed analysis of industry differences in OHS personnel, practices and performance.

However, the focus groups and key informant interviews did illuminate this issue. For example, metal fabrication firms whose main customers are Alberta oil and gas companies are most likely to have COR or OSSE certification because it is a customer requirement. Wood products firms can benefit from the increased attention to safety in the forestry and sawmill sector, and some (e.g. wood pellet manufacturing) have their own safety association. Wineries in the Okanagan are classified as food producers, but in addition to their wine production and bottling operations have sizeable agricultural activities in their vineyards. Given these sub-sector differences, when respondents say that an OHS professional should have 'manufacturing' work experience, this means something very different depending on the NAIC.

Figure 22 provides a detailed picture of the substantial differences between small, medium and large firms in the use of OHS personnel. For example, over 86% of large firms have a designated OHS position, compared with 29% of small firms. Indeed, on all of the measures in Figure 22, the larger the firm the more likely they are to be involved in recruiting, developing and planning to hire OHS professionals. As another example, 40% of large firms plan to hire an OHS professional in the next 5 years, compared with 9% of small ones.

A major regional difference is firm size, as can be seen in Figure 23. Small firms predominate in the north, medium-size firms in the Thompson Okanagan, small and medium-size firms on Vancouver Island and the Coast, and medium and large-size firms in the lower mainland.

Figure 23: Total number of employees in companies participating in the survey by region

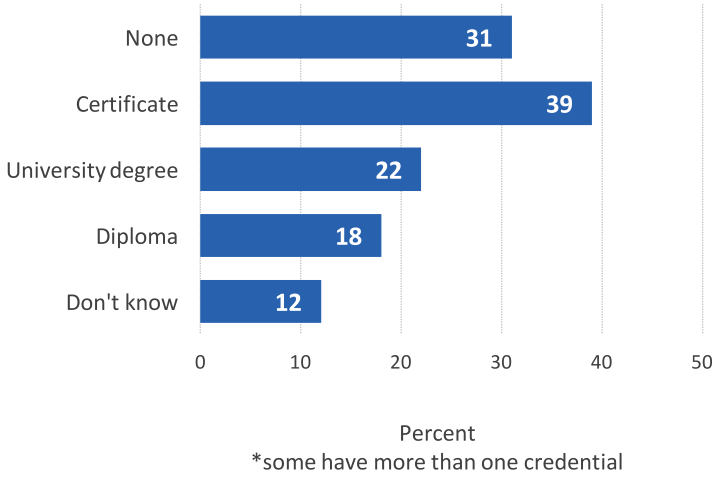


4.5 Professional qualifications of OHS personnel

The survey also provides details about the types of OHS qualifications possessed by workers in OHS roles (Figure 24). The first thing to note is that 31% of OHS workers in the firms surveyed had no formal OHS credentials.

The focus groups and key informant interviews confirmed that there are highly effective OHS personnel or managers at small and medium-size firms who have engaged in systematic self-paced learning in order to acquire the knowledge required to improve safety conditions at their company. Some also used the services of safety consultants or WorkSafeBC. Therefore, a lack of formal qualifications should not be assumed to equate with less effective guidance on OHS matters. These examples highlight the need for high-quality, on-line resources that address the immediate OHS needs of manufacturers.

*Figure 24: OHS workers' post-secondary OHS credentials**



The survey results show that employees in OHS positions (including respondents, if they are in this role) are most likely (39%) to have an OHS certificate, followed by a university degree (22%) or diploma (18%). Just over half of OHS workers do not have an OHS certification (Figure 25). Among those that do, CRSP and Construction Safety Officer (CSO) certifications are most common (18% and 15%, respectively). To reiterate an earlier point, these are very different qualification levels. Few OHS personnel in the manufacturing firms surveyed have other OHS certifications.

Most respondents (62%) reported that employees in OHS roles currently are not studying for an OHS certification, diploma, degree or other credential. Among those acquiring further OHS education, about one in five are studying for some sort of OHS credential, with the most common being the CRSP designation, followed by BCIT's OHS program (Figure 26). Based on the earlier assessment of OHS educational programs and professional credentials, these two are considered to set a high standard for qualifications.

*Figure 25: OHS workers' OHS certifications**

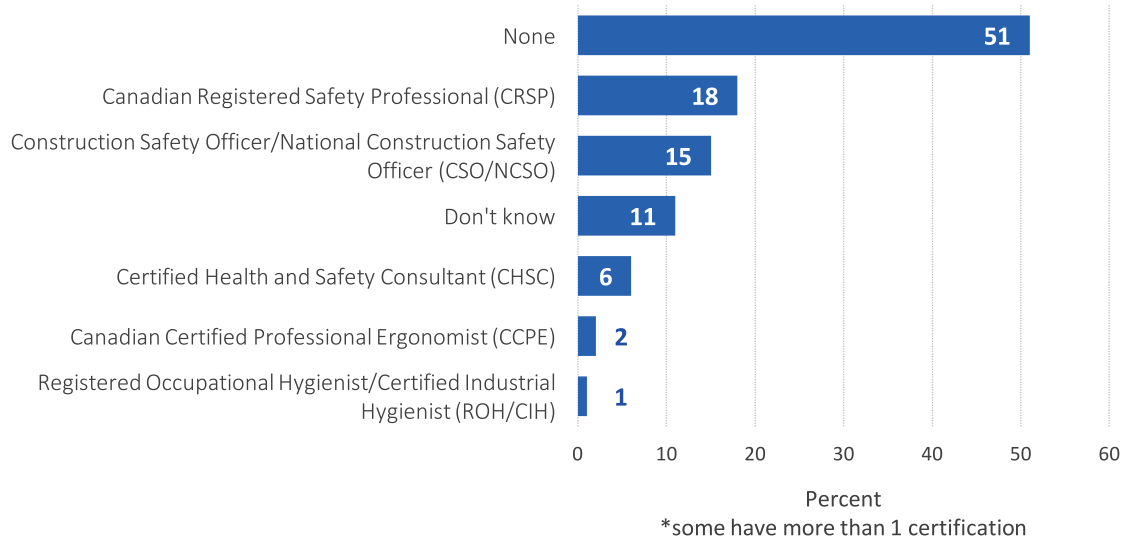


*Figure 26: Please describe all the credential(s) being studied for (n=35)**

Credential	Response (n)
CRSP	16
BCIT OHS program - certificate or diploma	9
Other	6
CSO/NCSO	2
University degree program	2

* This table reports a thematic analysis of 35 responses provided by 31 respondents to an open-ended question: "*Please describe all the credential(s) that is (are) being studied for.*" Only respondents whose companies have employees currently studying for an OHS certification, diploma, degree or other credential were asked this question.

4.6 Summary

- Just over half of the companies in the survey employ a full-time OHS worker. Few have more than one OHS position. Workers in OHS positions provide a wide range of support.
- About one in five survey respondents reported that an OHS worker had left their company in the past two years. Future research could usefully focus on why a sizeable number of firms dismissed workers in an OHS role, focusing specifically on the competencies associated with a worker being highly effective in an OHS role within manufacturing.
- One in five respondents reported that their company plans to recruit for an OHS position in the next five years. This suggests that future recruitment activity will be similar to the recent past.
- Few firms faced difficulties recruiting or have unfilled OHS positions. These survey findings suggest an adequate supply of OHS personnel at present. Almost all recruitment efforts focus within BC, also suggesting an adequate external supply of OHS professionals in the province.
- A more common strategy than external recruitment for acquiring required OHS expertise is for firms to train an existing employee for the role. This finding raises two questions for future research: Why do firms pursue this internal development strategy, rather than externally recruiting for OHS positions? What are the implications of these different approaches to acquiring OHS expertise on a firm's safety performance?

- According to the survey, the two most important job requirements are OHS knowledge and experience in an OHS role. Work experience specifically in manufacturing is seen as less important. While non-OHS skills were not among the 'most important' OHS job requirements identified by survey respondents, focus group participants did emphasize the growing importance of a wide range of soft skills for OHS professionals. Future research is needed to define the critical soft skills an OHS professional in manufacturing must possess to be effective in their role.
- Few companies require a specific OHS credential, with those that do preferring a CRSP or CSO designation. This finding could reflect the difficulties companies face trying to interpret how the numerous OHS credentials now available are relevant to their safety needs.
- Among manufacturing workers in OHS roles, the most common OHS qualification is a certificate, but less than half possess this. Many workers in OHS positions have no formal OHS credentials.

5 Supply and Demand Projections for OHS Occupations

> ***This section examines labour market projections regarding the supply of and demand for OHS professionals over the next five to ten years in Canada and BC. Primary research findings are used to assess the future supply of OHS professionals to meet the manufacturing sector's needs.***

Two sources of labour market projections are used for OHS occupations. The Canadian Occupational Projection System (COPS) provides projections for OHS-relevant occupations nationally. As background, Employment and Social Development Canada (ESDC) uses the COPS models to estimate the future number of job openings and job seekers for 292 occupational groupings nationally (based on the 2011 NOC). The projections help to identify occupations that may face labour shortages, or labour surpluses, over the medium term (the 2015 to 2024 period).[40] COPS is the only reliable source of future supply and demand for OHS occupations nationally.

The future job market for OHS occupations in British Columbia is assessed using the British Columbia 2025 Labour Market Outlook for labour market supply and demand forecasts for OHS-related occupations.

Both of these were compared with primary research findings about manufacturers' future OHS personnel needs to reduce lost-time injuries.

40 Government of Canada Canadian Occupational Projection System (COPS). occupations.esdc.gc.ca/sppc-cops/w.2lc.4m.2@-eng.jsp

5.1 COPS occupational projections for Canada

COPS occupational projections are obtained by comparing the difference between the projected total number of new job seekers in an NOC with job openings over the period from 2015 to 2024. Also considered are labour market conditions in recent years. For example, if the analysis of key labour market indicators suggests that the number of job seekers was insufficient to fill the job openings (a shortage of workers) in an occupational group in recent years, the projections are used to assess if this situation will continue over the projection period or if the occupation will move towards balanced conditions.

The 292 occupational groups in the 2011 NOC do not include a code for 'health and safety professionals', as there is for human resource professionals.[41] Rather, the responsibility for OHS is distributed across three occupational groups in the NOC, each of which includes job titles within occupational health and safety:

- Human resources managers (NOC 0112).
- Inspectors in public and environmental health and occupational health and safety (NOC 2263).
- Health policy researchers, consultants and program officers (NOC 4165).

Figure 27 shows that none of these 4-digit NOC titles refers to occupational health and safety, although some more specialized job descriptions within each NOC are OHS-focused.

Figure 27: 4-Digit NOCs for OHS occupations

0112: Human resources managers

- manager, occupational health and safety
- occupational health and safety manager

2263: Inspectors in public and environmental health and occupational health & safety (also listed in NOC

2261: Non-destructive testers and inspection technician; Engineering inspectors and regulatory officers; Inspectors in public and environmental health and occupational health and safety)

- field supervisor – occupational health and safety
- industrial safety officer – occupational health and safety
- inspector, occupational health and safety
- labour affairs officer – occupational health and safety
- labour standards officer – occupational health and safety
- occupational health and safety officer
- officer, occupational health and safety

4165: Health policy researchers, consultants and program officers

- prevention officer – occupational health and safety

Source: Statistics Canada. National Occupational Classification (2011). statcan.gc.ca/eng/subjects/standard/noc/2011/index

41 Government of Canada. National Occupational Classification - Resources & Tools. www5.hrsdc.gc.ca/NOC/English/NOC/2011/Welcome.aspx

There were occupational health and safety managers (0112) and occupational health and safety officers (2263) among survey respondents and focus group participants. However, none could be classified within NOC 2261. Furthermore, NOC 4165 is not relevant for the purposes of this study, given that it encompasses health policy researchers, consultants and program officers employed by government departments and agencies, consulting establishments, universities, research institutes, hospitals, community agencies, educational institutions, professional associations, non-governmental organizations and international organizations. Jobs in NOC 4165 would not be found in manufacturing. Still, it is worth noting that the COPS projection estimates a balance in demand and supply for jobs in NOC 4165.

Figure 27 lists detailed occupational titles in the occupational health and safety area. There are four relevant insights based on what this list does and does not contain:

1. Only one industry – construction – has an industry-specific OHS occupation, which in 2014 employed 18,900 individuals. The projected demand in this construction-specific OHS occupation between 2014 and 2025 is 7,500 openings, while 7,000 new job seekers are expected to enter the occupation. The result is what the COPS projection considers a 'balance' between supply and demand. This employment projection is relevant, because construction is the closest to manufacturing. Interestingly, there are no OHS-specific occupations included in the forestry or oil and gas sectors, despite their importance to the Canadian economy.
2. The absence of a dedicated OHS job title for manufacturing, such as "manufacturing health and safety officer" is a notable labour market information gap. However, while the survey and focus groups confirm that such positions do exist in Canada there are too few of them to warrant an occupational title in the NOC.
3. Engineering occupations have designated responsibility for industrial safety in manufacturing in the NOC. To the extent that BC manufacturers employ industrial engineers, there could be potential to include worksite safety in their job descriptions. However, there is no evidence of this based on focus group discussions, key informant interviews or survey results.
4. The capacity of post-secondary institutions to produce more OHS-specialized graduates is also worth noting. NOC code 4021 includes college and other vocational instructors teaching programs in health and safety and industrial safety. This NOC is expected to experience a shortage by 2025 (an estimated shortage of 6,000 qualified job seekers). A shortage of instructors who can teach diploma or certificate courses in OHS could limit the expansion of OHS educational programs.[42]

42 Government of Canada. occupations.esdc.gc.ca/sppc-cops/occupationsummarydetail.jsp?&tid=127

Reviewing the list of occupations in Figure 27, the NOC most directly related to OHS is 2263. This NOC includes health and safety inspectors, officers, technicians, and technologists. However, these detailed occupations are subsumed under the broader NOC 2263, Inspectors in public and environmental health and occupational health and safety. Note that, NOC 2263 is subsumed under NOC 2261, which is the basis for the projection.

Figure 28: OHS-Relevant Occupational Projection Summaries, 2015-2024, based on 4-digit NOC codes

	NOC 0112: Human resource managers	**NOC 2263: Inspectors in public and environmental health and occupational health & safety**
Occupations included	Human resource managers	Inspectors in public and environmental health and occupational health & safety
Skill type	Management occupations	Natural and applied sciences and related occupations
Skill level	Management occupations	College, vocational education, or apprenticeship
Employment in 2014	35,800	49,100
Median age - 2014	45.5 years	43.5 years
Estimated median age of retirement – 2014	61 years	59 years
New job openings, 2015-2024	17,200	27,600
New job seekers, 2015-2024	17,400	27,900
Supply-demand balance	Labour supply and demand are expected to be balanced	Labour supply and demand are expected to be balanced (based on projections 3 occupations combined: NOC 2261, 2262 & 2263)

Source: Government of Canada, occupations.esdc.gc.ca/sppc-cops/w.2lc.4m.2@-eng.jsp

Figure 28 provides details of the COPS projections for NOC 0112 (Human resource managers, which also includes OHS managers) and NOC 2263 (Inspectors in public and environmental health and occupational health and safety). The main conclusion from both projections is a balance of demand and supply between now and 2024. Survey and focus group results suggest that the responsibility for OHS falls under human resources in relatively few companies. More specifically, eight percent of survey respondents are in HR positions (see Appendix B.2). Only three percent of individuals in OHS positions in the firms surveyed report to an HR manager (Figure 15). Furthermore, several focus group participants had joint responsibility for HR and OHS.

The most recent and detailed attempt to model the supply and demand for manufacturing occupations is the *2015 National Manufacturing Labour Market Information Report.*[43] The projected 'recruitment challenges' for technical occupations in manufacturing are based on a national survey of 373 manufacturing employers. Survey results show that only six firms (or 1.9% of survey respondents) faced recruitment challenges for 'inspectors in public and environmental health and occupational health and safety' (NOC 2263). However, the small number of firms in this survey makes it difficult to draw general conclusions in this regard.[44]

Moreover, this 2015 national report raises an interesting scenario that could apply to OHS functions within manufacturing firms. A common theme across all regions is that outsourcing of specific skills – notably human resources, information technology, and engineering – is becoming increasingly common.[45]

The fact that HR is being outsourced could mean that OHS functions could also be outsourced. However, the report makes no mention of this possibility and it was not raised in focus group discussions. Still, given the often close integration of OHS and HR functions, this scenario should not be ruled out.

5.2 British Columbia 2025 Labour Market Outlook

The *British Columbia 2025 Labour Market Outlook* provides labour market supply and demand forecasts for detailed occupations (i.e. 4-digit NOCs). The *Outlook* is helpful for identifying those occupations where job openings are expected, and those where there will be reduced employment opportunities. The forecast covers OHS-relevant NOCs examined above, as well as other occupations of interest to manufacturing employers. Specifically, three projections deserve attention:

1. Senior managers in construction, transportation, production (i.e., manufacturing) and utilities (NOC 0016) are listed as a 'top opportunity' occupation, based on 3,600 projected job openings to 2025.[46]
2. Human resources professionals (NOC 1121) are among the 'top opportunity' occupations that usually require a university degree. Some 2,200 job openings for HR professionals are expected to 2025.
3. On the list of 'top opportunity' in occupations that usually require a diploma, certificate or apprenticeship training are inspectors in public and environmental and occupational health and safety (NOC 2263). This is where OHS occupations are classified. This NOC is expected to have 1,300 job openings by 2025.

43 Canadian Manufacturers and Exporters and the Canadian Skills Training and Employment Coalition. (2015). *The Future of the Manufacturing Labour Force in Canada*. CME/CSTEC NATIONAL MANUFACTURING LABOUR MARKET INFORMATION REPORT.
44 Ibid, 44.
45 Ibid, 11
46 *British Columbia 2025 Labour Market Outlook*, pp. 24-25. workbc.ca/getmedia/00de3b15-0551-4f70-9e6b-23ffb6c9cb86/LabourMarketOutlook.aspx

5.3 Assessing labour market projections for OHS occupations

Based on the information presented regarding the supply of OHS professionals and occupational projections for OHS positions, two important questions arise:

- Are the estimates of job openings provided in the *BC 2025 Labour Market Outlook* reasonable?
- Will there be an adequate supply to meet the expected demand?

By combining three main data sources for this project – primary data, information on post-secondary OHS programs, and OHS certifications – it is possible to draw informed conclusions about the supply and demand for OHS professionals.

The British Columbia 2025 Labour Market Outlook estimates 1,300 job openings in NOC 2263, the occupational category that includes OHS jobs requiring a diploma or certificate. Based on the project's primary research, this seems to be a reasonable estimate. It averages out to 130 new OHS job openings annually over the 10-year projection period. Based on survey findings, these new positions could be filled either internally or externally. Given that BC post-secondary OHS diploma and certificate programs currently are graduating approximately 180 students annually (based on Figure 11), there should be an adequate supply of qualified candidates for these predicted job openings.

There are several other factors to consider when assessing the supply and demand projections. Among the firms in the survey, relatively few experienced difficulties recruiting for an OHS position (see Figure 17). Over one in five expect to be recruiting for an OHS position in the next few years, which is the same level of recruitment activity as in recent years. So in the medium-term, recruitment levels should remain stable. Firms also are more likely to train existing employees to fill OHS positions, rather than relying on external recruitment. The availability of post-secondary OHS certificate programs and the ease of accessing them indicate that internal OHS candidates should not experience difficulties upgrading their OHS training.

However, four major trends could influence OHS professionals' supply and demand in ways that are difficult to predict:

Economic environment: If Alberta's energy sector experiences a recovery from low oil prices, the increased demand for OHS professionals could draw some OHS professionals from BC. This point was emphasized in several focus group discussions.

Increasing certification standards: New requirements for applicants to the CRSP certification exam in 2018 could create barriers to entry in the short-term, reducing the number of individuals receiving this OHS credential and the number of applicants to OHS certificate programs in BC post-secondary institutions. This point was made in several key informant interviews. However, over the longer-term there could be increased interest in entering the OHS profession if higher standards make an OHS career more rewarding.

Changing supply chain requirements: If more companies require suppliers to meet specific OHS standards, this will result in more manufacturers introducing OHS management systems which, in turn, could fuel the demand for OHS professionals to oversee these systems. Based on focus group discussions and interviews, this trend is evident today in metal fabricators and other suppliers to Alberta's energy sector. Regardless of their size, these suppliers are contractually required to have a COR, OSSE or ISO safety certification.

New WorkSafeBC regulations: It is reasonable to expect that WorkSafeBC will continue to increase health and safety requirements that employers must meet. Recent examples are the new (as of April 2017) requirements for joint health and safety committee member and worker health and safety representative training and the annual evaluation of joint health and safety committees.[47]

Another factor is the expected shortage of post-secondary instructors in the OHS area. However, based on focus group and interview input, it seems that many of the instructors contributing to certificate and diploma OHS programs in BC are not full-time employees of post-secondary institutions, but rather private-sector OHS trainers or consultants – a group not included in the NOC for college-level instructors.

47 WorkSafeBC: worksafebc.com/en/about-us/news-events/announcements/2017/April/changes-joint-health-safety-committees

5.4 Summary

- The OHS jobs relevant to manufacturing are included in NOC 0112 (human resources managers) and NOC 2263 (inspectors in public and environmental health and occupational health and safety). COPS projections for NOC 0112 and NOC 2263 show a balance of demand and supply between now and 2024 at the national level.
- The lack of a specific NOC for OHS roles in industry means that these COPS projections include other jobs not relevant to the scope of this Sector LMP project. This labour market information gap makes it difficult to accurately estimate the future supply of and demand for OHS professionals.
- NOC 4021 includes college and other vocational instructors teaching programs in health and safety and industrial safety. This NOC is expected to experience a shortage of 6,000 qualified instructors by 2025, which could limit the expansion of post-secondary OHS programs in BC.
- The overall demand for OHS professionals is expected to grow in BC. Projections for the supply of and demand for OHS professionals in BC seem reasonable and fit with the primary research findings of this study.
- According to the British Columbia 2025 Labour Market Outlook, OHS-relevant NOCs are on the list of 'top opportunity' occupations, with 130 new OHS job openings annually over the 10-year projection period.
- OHS programs at BC's post-secondary institutions are expected to provide an adequate supply of qualified candidates for these positions.
- Manufacturers could meet the increasing demand for OHS professionals either through external recruitment or the internal development of OHS expertise.
- There are four trends that could influence the BC labour market for OHS professionals over the next five to ten years: the changing economic environment; a trend to higher standards for OHS certification; supply chain requirements for manufacturers to have OHS management systems; and new WorkSafeBC regulations.

6 Effective OHS Practices for BC Manufacturing

> ***This section summarizes the relevant research on OHS practices that contribute to making workplaces safer and reducing lost-time injury rates. The use of evidence-based practices by BC manufacturers is investigated using survey results, which also provides a unique perspective on how these practices vary by firm characteristics and, furthermore, are related to better safety outcomes.***

This section begins with an overview of research on determinants of safe workplaces, focusing on studies most relevant to BC manufacturers. Survey findings document a range of safety practices used by manufacturers, including membership in a safety association, being a BC Safety Charter signatory, use of OHS management systems, company safety certifications, and OHS training and development.[48] Survey evidence confirms that these safety practices are related to improved safety performance. The survey results are complemented by what focus group participants and key informants consider to be effective safety practices for their firms

48 The BC Safety Charter is a commitment from industry and organizational leaders to create a workplace culture based on the principle that the effective management of health and safety is essential to long term profitability and sustainability. See: bcsafetycharter.ca

6.1 Evidence-based effective practices for improving workplace safety

There is extensive research investigating a range of factors contributing to workplace safety. While none of the studies published in peer-reviewed journals specifically focuses on the role of OHS personnel, there is extensive literature on workplace safety that has implications for the role of OHS professionals and for manufacturers.

Five areas of research are relevant in this regard:

1. Safety climate and culture;
2. Leadership;
3. Occupational health and safety management systems;
4. OHS training; and
5. Joint health and safety committees.

6.1.1 Safety climate and culture

Safety climate refers to employees' shared perceptions about the relative importance of working safely in their roles.[49] A strong safety climate reinforces for employees that safety takes priority over productivity, and it increases the frequency of safe work behaviour. Because climate refers to perceptions that are at the surface in a workplace, it is more directly measurable with employee surveys than deeper features of an organization's culture, such as unwritten and unspoken beliefs and values. When managers and OHS practitioners talk about a 'safety culture' they are mostly referring to what experts define as climate – in other words, employees' perceptions about safety.

49 Zohar, D. (2014). Safety climate: Conceptualization, measurement, and improvement. *The Oxford Handbook of Organizational Climate and Culture*, 317-334.

The combined results from over 200 studies confirm that safety climate is a robust predictor of both subjective (e.g., employees' perceptions) and objective (e.g., injury rates) safety outcomes across all industries in many countries.[50] A 2014 study of safety climate identified that "*the more coherent and comprehensive safety policies are and the more frequently they are communicated and influenced during production processes, the greater is the perceived management commitment to employee protection, constituting the core meaning of safety climate.*" [51] The key enablers of a strong safety climate are managements' investments in developing, implementing and enforcing OHS policies, putting in place an OHS management system, and demonstrating leadership on safety matters. OHS professionals can play a critical role in these areas.

Other research emphasizes three inter-related dimensions of safety climate, each of which has implications for the OHS professional's role. According to a safety climate study in 20 heavy manufacturing companies, a strong safety climate rests of the foundations of compliance (monitoring and controlling potential risks and hazards), caring (declaring what safe practices are and informing all employees about these), and coaching (instructing and guiding employees on safe behaviours).[52] These three dimensions fall within the responsibilities of OHS professionals in BC manufacturing firms, as confirmed by survey and focus group findings.

Safety culture is the foundation for a safety climate. A positive safety culture refers to the values, attitudes, beliefs, perceptions and behaviour that guide an organization's commitment to safety.[53] For large firms, developing and maintaining a safety culture can be an explicit goal. However, among small and medium-size enterprises (SMEs) the lack of OHS management systems, or even safety policies, puts much greater importance on the role of the company's overall culture in promoting safe practices.[54] In SMEs, the visible signs of a culture that values health and safety are company investments in safety training, safety audits and investigations, and obtaining a safety certification.

50 A meta-analysis is a 'study of studies' which pools their empirical results to determine if common conclusions can be drawn.
51 Zohar, op. cit., 318.
52 Johnson, S. E. (2007). The predictive validity of safety climate. *Journal of Safety Research*, 38(5), 511-521.
53 Nordlöf, H., Wiitavaara, B., Winblad, U., Wijk, K., & Westerling, R. (2015). Safety culture and reasons for risk-taking at a large steel-manufacturing company: Investigating the worker perspective. *Safety Science*, 73, 126-135.
54 Cagno, E., Micheli, G. J. L., Jacinto, C., & Masi, D. (2014). An interpretive model of occupational safety performance for Small-and Medium-sized Enterprises. *International Journal of Industrial Ergonomics*, 44, 60-74.

There is one study of safety culture in BC manufacturing firms, which used a survey tool – the eight-item Organizational Performance Metric (OPM) – to predict injury claim rates. The OPM measures organizational and management factors that improve health and safety performance.[55] The OPM tool is being used by WorkSafeBC to measure and improve workplace safety cultures.[56] The OPM predicted lower claim rates in the BC study, mainly because of the presence of OSSE and BC Safety Charter firms in the sample. Research conducted in Ontario manufacturing firms using the OPM shows a clear relationship between a 'safety culture' and lower claims rates.[57]

One team of experts recommends five evidence-based guidelines for the successful promotion of safety cultures in manufacturing firms: [58]

1. Make employees believe in safety by starting with a commitment from senior management and constant reinforcement of positive safety behaviours through feedback to employees.
2. Send appropriate signals that safety matters by not 'normalizing' unsafe practices, clearly communicating the importance of safe work practices, and getting employees involved in hazard identification and risk reduction.
3. Create a learning environment that encourages open discussion of safety, supported by documentation and reporting of errors and incidents.
4. Search for solutions, investigating root causes of errors and accidents at all levels.
5. Prepare workers, supervisors and managers through on-going training that is based on a training needs analysis, clear objectives, realistic training scenarios and evaluation to ensure training is transferred to the job.

55 Marino, S. C., McLeod, C., Tamburic, L., Quirke, W., Koehoorn, M., & Amick, B. (2016). Leading indicators: applying the institute of work and health *(IWH) organisational performance metric (OPM) to British Columbia (BC)*, Canada. *Occupational and Environmental Medicine, 73*, A17. oem.bmj.com/content/73/Suppl_1/A17.3

56 Macatee, G. (April 2016). *Final Report on the WorkSafeBC Review and Action Plan*. WorkSafeBC. worksafebc.com/en/resources/law-policy/reports/final-report-worksafebc-review-action-plan?lang=en

57 Institute for Work and Health. *IWH Organizational Performance Metric (IWH-OPM) project*. iwh.on.ca/opm. There is an OPM benchmark for vehicle and industrial equipment manufacturing.

58 Wilson-Donnelly, K. A., Priest, H. A., Salas, E., & Burke, C. S. (2005). The Impact of Organizational Practices on Safety in Manufacturing: A Review and Reappraisal. *Human Factors and Ergonomics in Manufacturing*, 15, 151-68.

6.1.2 Training

Training is one of the keys to improving workplace safety. A study of 121 Ontario manufacturing firms found a direct link between lower lost-time injuries and the provision of OHS training.[59] A meta-analysis of 29 training studies found strong evidence for the effectiveness of OHS training on workers' safety-related attitudes and beliefs, which contributes to a safety climate.[60] However, according to this study not all forms of training are equally successful. The most effective training method seems to be individual self-paced learning lasting one hour at a time and that is voluntary for the worker. While classroom training is widely used, the study concludes that it is less effective.

OHS training effectiveness could be improved by moving away from the traditional classroom approach to training delivery. However, this may be challenging. A report by the Conference Board of Canada, based on a study of 152 Canadian organizations, found that instructor-led classroom learning still is the dominant method of delivery for all forms of corporate training, far more common than on-line or self-paced learning.[61]

These training issues need to be examined within manufacturing settings. However, evidence is limited in this regard. Some insights about training in manufacturing are provided by a study of innovative training delivery models conducted by Canada's Wood Manufacturing Council.[62] The study emphasizes the need for more innovative training methods. Wood manufacturing (NAICS 321) is dominated by small and medium enterprises. Most of these firms do not have employee training plans. Only one firm studied integrated face-to-face and e-learning (using the Internet). Despite the potential for smart phones and mobile devices to enable on-going worker training, no companies in the study used such devices for training. The two main barriers to this were company policies banning mobile phones from workplaces and an industry culture that is slow to adopt new approaches. To what extent these findings also apply to other types of manufacturers remains an unanswered question.

59 Geldart, S., Shannon, H. S., & Lohfeld, L. (2005). Have companies improved their health and safety approaches over the last decade? A longitudinal study. *American Journal of Industrial Medicine*, 47, 227-236.

60 Ricci, F., Chiesi, A., Bisio, C., Panari, C., & Pelosi, A. (2016). Effectiveness of occupational health and safety training. *Journal of Workplace Learning*, *28*, 355-377.

61 Hall, C., & Cotsman, S. (2015). *Learning as a Lever for Performance: Learning and Development Outlook – 13th Edition*. Ottawa: Conference Board of Canada.

62 Macdonald, I. *Innovative Models for Delivering Training to Workplace Learners*. Wood Manufacturing Council. wmc-cfb.ca/sites/default/files/Integrated%20Training%20Study%20-%20Final%20Report.pdf

Other industry trends may help to speed up the adoption of better safety training methods. Specifically, new production technologies can improve the delivery of safety training. This point was brought up in focus groups. The Wood Manufacturing Council study suggests that the introduction of advanced production technology and lean production methods have the potential to improve workplace safety.[63] For example, new automated machinery comes with its own training videos, manuals and other resources on standard operating procedures, including safety.

Most OHS research focuses on larger firms, despite the fact that injury rates are higher in smaller firms. A systematic review of studies on the effectiveness of OHS interventions in small companies (defined by the researchers as 100 or fewer employees) identified the provision of worker OHS training as an effective practice, leading to positive effects on workers' safety-related attitudes and behaviours.[64] Combining OHS training with safety audits is particularly effective for small businesses.

6.1.3 Leadership

Leaders play a crucial role in promoting a safe workplace. A meta-analysis of 59 studies found a strong relationship between the qualities of an organization's leaders and employees' perception of a safety climate.[65]

One set of leadership traits that stands out is a well-established link between what experts call 'transformational leadership' and a safer workplace. Transformational leaders contribute to the future success of their organizations by encouraging employees and managers to see opportunities and challenges in new ways, motivating others to strive for higher levels of performance, being admired and trusted, stimulating creative thinking, and being/acting as a coach or mentor. When combined, these leadership behaviours can positively influence safety results and the development of a safety culture.[66]

63 On lean systems, see: Longoni, A., Pagell, M., Johnston, D., & Veltri, A. (2013). When does lean hurt? An exploration of lean practices and worker health and safety outcomes. *International Journal of Production Research, 51*, 3300-3320.

64 Breslin, F. C., Kyle, N., Bigelow, P., Irvin, E., Morassaei, S., MacEachen, E. et al. (2010). Effectiveness of health and safety in small enterprises: A systematic review of Quantitative Evaluations of Interventions. *Journal of Occupational Rehabilitation, 20*, 163-179.

65 Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). *A meta-analytic investigation of individual and contextual influences on workplace safety, satisfaction, and well-being*. msu.edu/~morgeson/nahrgang_morgeson_hofmann_2011.pdf.

66 Barling, J., Loughlin, C., & Kelloway, E. K. (2002). Development and test of a model linking safety-specific transformational leadership and occupational safety. *Journal of Applied Psychology, 87(3)*, 488-496.

Recall that OHS-specific knowledge and skills are considered more important by survey respondents than leadership or communication skills. In contrast, focus groups underscored the relevance of leadership, communication and other soft skills to successful OHS professionals. These research findings should be viewed in light of academic research on the importance of leadership in safety. Indeed, the lack of consensus on the importance of leadership skills identified in this project's survey and focus groups points to a need to better educate managers and OHS personnel in manufacturing about the positive contributions this skill set can make to achieving safety goals.

6.1.4 OHS management systems

Health and safety management systems increasingly are viewed as essential for a safe workplace. The American Society of Safety Engineers (ASSE) claims that high-performing US employers have been able to reduce workplace deaths, injuries and illnesses because of well-implemented OHS management systems.[67] The OHS profession in the US has grown substantially over the past three decades, playing a greater role in this regard. Indeed, the ASSE claims that expertise in all aspects of OHS management systems defines the OHS profession's 'value proposition'. In BC manufacturers, the survey indicates that 100% of workers in OHS roles have responsibility for developing and implementing OHS systems (see Figure 16). Beyond this survey finding, however, little is known about the role of OHS personnel in OHS management systems.

This is despite the fact that many academic studies confirm the benefits of OHS management systems. A systematic review of this literature concluded that voluntary systems (as we find in BC) generally have a positive impact on company's safety outcomes.[68] Benefits include an improved safety climate, increased hazard reporting by workers, more company action on OHS issues, decreased injury rates, and decreased disability costs. Central to an effective OHS management system is a focus on being proactive (as opposed to reactive), taking an integrated approach to safety, and including evaluation and continuous improvement.

67 Safety & health program management guidelines. (April 2016). *Professional Safety, 61 (4),* 59-60.

68 Robson, L. S., Clarke, J. A., Cullen, K., Bielecky, A., Severin, C., Bigelow, P. L. et al. (2007). The effectiveness of occupational health and safety management system interventions: A systematic review. *Safety Science, 45,* 329-353.

A common international standard for safety management is the OHSAS 18001 (which 6% of our survey respondents' firms have obtained, as noted below). A study of the conditions under which OHSAS 18001 was adopted by firms and the safety improvements it brought draws some interesting conclusions.[69] Specifically, firm size was not a factor that influenced the adoption of this standard. The economic and organizational costs of adopting the OHSAS 18001 are affordable for businesses of any size. The study concludes that investing in safety systems has long-term benefits for an organization's safety performance and productivity.

Lean production systems in manufacturing can have either positive or negative consequences for safety. Ensuring positive results depends on a systematic approach that embeds safety goals into all stages of implementing and sustaining lean production.[70] In other words, the successful and safe use of new technologies and production systems requires a strong OHS management system.

6.1.5 Joint health and safety committees

Joint health and safety committees are required in BC for firms with 20 or more employees. They are generally recognized as having a positive influence on safety performance. A systematic review of the research on the effectiveness of joint health and safety committees, sponsored by WorkSafeBC, provides solid support for these committees being mandatory and documents their important contributions to workplace safety.[71]

However, legislated committees alone are not sufficient to ensure a safer workplace. Committee members require appropriate education and training, must feel empowered by a strong mandate to be proactive in addressing a wide range of health and safety issues, and need the resources and capabilities to monitor leading safety indicators (as opposed to just lagging indicators, such as lost-time injuries and fatalities).

69 Abad, J., Lafuente, E., & Vilajosana, J. (2013). An assessment of the OHSAS 18001 certification process: Objective drivers and consequences on safety performance and labour productivity. *Safety Science, 60*, 47-56.

70 Sakouhi, A. & Nadeau, S. (2016). Integration of occupational health and safety into lean manufacturing: Quebec aeronautics case study. *American Journal of Industrial and Business Management, 6*, 1019-1031.

71 Yassi, A., Lockhart, K., Sykes, M., Buck, B., Stime, B., & Spiegel, J. M. (2013). Effectiveness of joint health and safety committees: A realist review. *American Journal of Industrial Medicine*, 56, 424-438.

6.1.6 Use of evidence-based effective practices in BC manufacturing firms

All the evidence-based effective OHS practices documented in research studies are found to varying degrees in BC manufacturing firms. Focus groups and key informants emphasized, more than anything else, the potential for firms to continuously improve their safety practice, being increasingly proactive in identifying and reducing health and safety risks and hazards. The practices documented in the survey, focus groups and interviews – which are described below – require on-going commitment, support, encouragement and resources. The employment of an OHS professional, or more of these personnel, is not a pre-condition for moving further down the path to a safer and healthier workplace.

Focus group discussions emphasized the importance of leadership for achieving safety goals. They left no doubt that some BC manufacturers with excellent safety records have transformational leaders at the executive level and among OHS personnel. As already noted, focus group participants also emphasized the need for communication, leadership, mentoring, and collaboration. These and other soft skills are essential competencies for a safety professional in order to move beyond the traditional 'enforcer' or 'safety police' role and engage other workers in thinking and acting 'safety'.

Two firms that were profiled in key informant interviews – Tinhorn Creek Vineyards (a winery and restaurant) and Pinnacle Renewable Energy Inc. (a manufacturer of wood pellets) – have recently won safety awards in recognition of their outstanding safety records.[72] The journey of each firm from when they faced numerous safety problems to a point several years later when managers and employees at all levels 'owned' safety goals provides important lessons for other manufacturers. Success factors in these two companies mirror evidence-based effective practices: leadership commitment, an OHS management system adapted to the needs of the worksite, clear improvement goals, appropriate training – this combination of will, focus, effort and resources is what builds a strong safety culture. Expert OHS advice and support from WorkSafeBC and safety associations helped both firms to put these success factors in place.

72 Tinhorn Creek received a Canada's Safest Employers Award in 2016: safestemployers.com/winners
Pinnacle received a Leadership in Safety Award from the BC Forest Safety Council in 2016: www.bcforestsafe.org/AnnualSafetyAwards.html.

Focus groups and key informant interviews also emphasized the importance of on-going training for achieving a company's safety goals. Training for supervisors and joint health and safety committees were considered priorities. A number of study participants in OHS positions had acquired an OHS certification mid-career. For them, having access to on-line and self-paced courses was essential. More generally, quick and easy access to internet-based training on specific topics is a common training practice in many of the focus group companies.

Focus groups emphasized the crucial role of joint health and safety committees in achieving safety goals. Ongoing training for joint health and safety committee members is also a key success factor, along with having a clear operating mandate from senior management. For many of the firms participating in the focus groups, their joint health and safety committee employee and management members became safety champions.

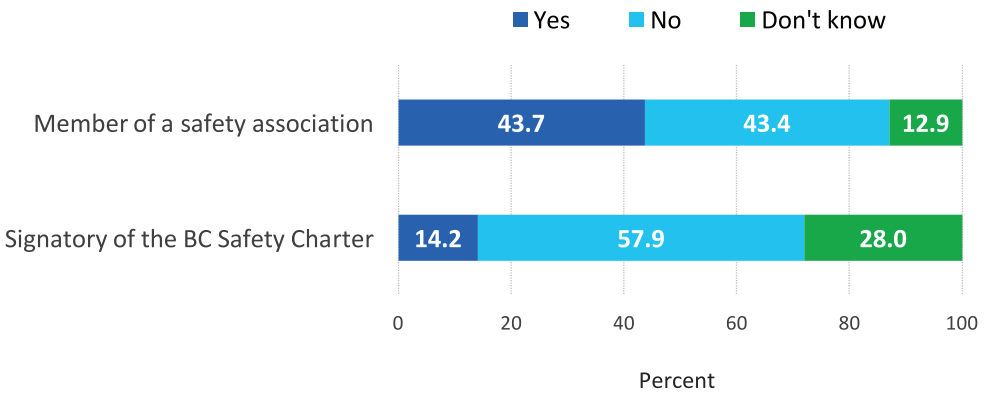
6.2 BC manufacturing firms' safety practices and performance

The survey findings, outlined below, identified specific factors that can enable firms to move faster down the path to a safe and healthy workplace.

6.2.1 Safety Association Membership

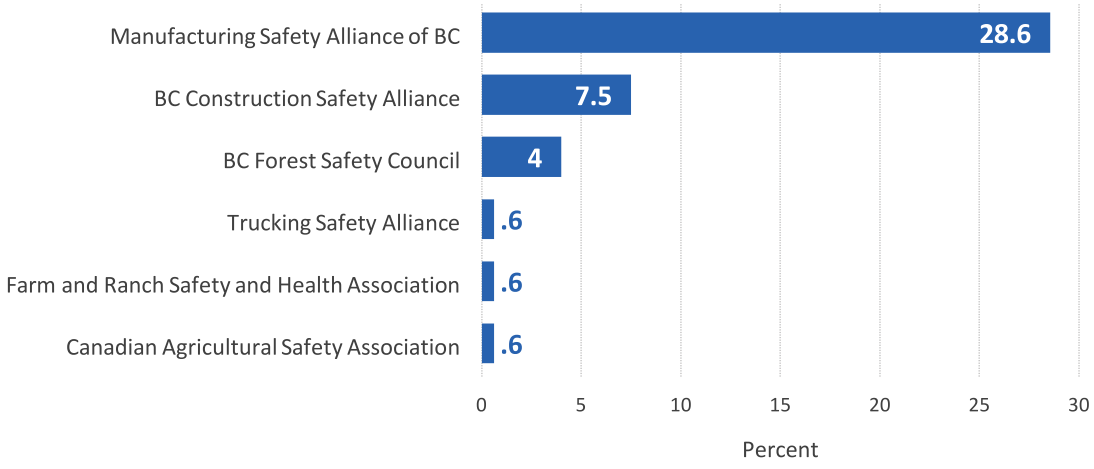
Most survey respondents and their firms do not belong to a safety association. As Figure 29 shows, 44% are members of a safety association and 14% are signatories of the BC Safety Charter.

Figure 29:
Safety association membership and BC Safety Charter signatories among respondents and their companies



Among those reporting a safety association membership, the largest group – 29% of all respondents – belong to the Manufacturing Safety Alliance of BC (Figure 30).

Figure 30: Percentage of all respondents/companies belonging to specific safety associations



It is noteworthy that 13% of respondents do not know if their company belongs to a safety association and even more (28%) don't know about the BC Safety Charter. These findings suggest that association members and Charter signatories could better communicate how these partnerships help firms make their workplaces safer.

Further statistical analysis compared BC Safety Charter signatory companies with non-signatories on seven indicators of OHS practices:

1. employing a full- or part-time OHS worker;
2. recruiting for an OHS position in the past two years;
3. difficulty recruiting for this position;
4. having trained an existing employee to fill an OHS position;
5. turnover among OHS workers in the past two years;
6. unfilled OHS positions; and
7. plans to recruit for an OHS position in the next five years.

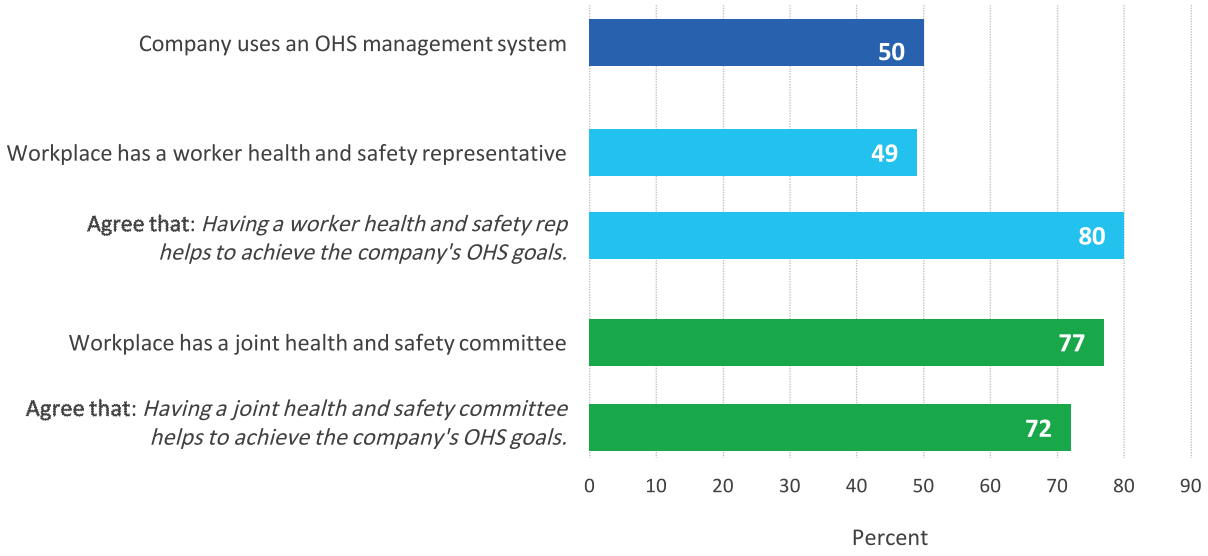
There were two statistically significant differences between signatory and non-signatory companies. Signatories were more likely to employ an OHS worker (83% versus 55%), and were also slightly more likely (52% versus 45%) to train employees internally to fill OHS positions.

The same analysis using the seven indicators listed above also compared firms that are safety association members with those that are not. On all seven indicators, safety association member firms were significantly more likely to be employing, training and recruiting OHS personnel. For example, 82% of safety association members employ an OHS worker, compared with 40% of non-members. And 44% of association members trained an existing employee to fill an OHS position, compared to 19% of non-members. One-third of association members plan to recruit for an OHS position in the next 5 years, compared with 14% of non-members. Clearly, the rate at which BC manufacturers become BC Safety Charter signatories or join safety associations will influence the demand for OHS professionals.

6.2.2 OHS practices in BC manufacturing firms

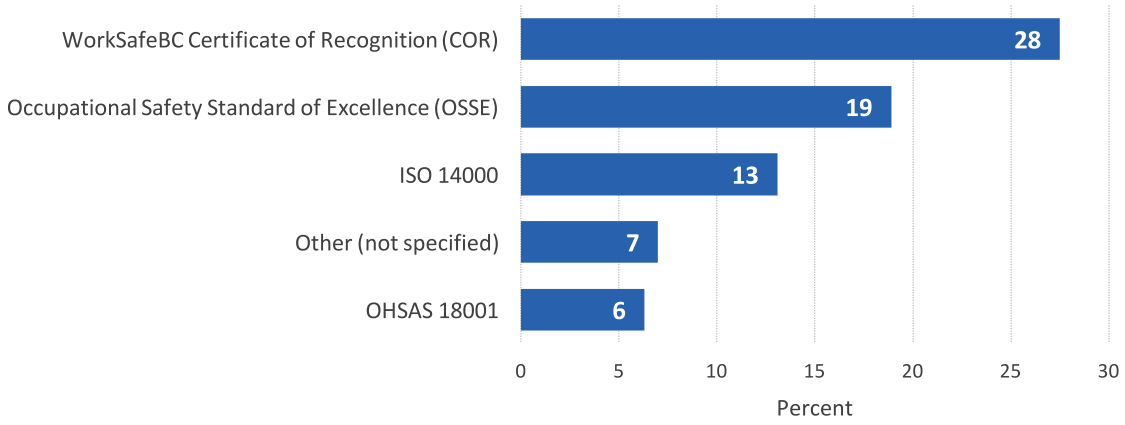
This section examines the health and safety practices of respondents' companies. Half of these manufacturing firms use an OHS management system (Figure 31). About half (49%) of firms with fewer than 20 employees have a worker health and safety representative. A large majority (80%) of smaller firms agree that having a worker health and safety representative helps them achieve their OHS goals. Among medium and large-size firms, 77% have a joint health and safety committee, which about three-quarters consider helpful in achieving the company's OHS goals.

Figure 31: Company health and safety practices



Some firms have received voluntary safety certifications for implementing OHS management systems (Figure 32). Less than a third (28%) has a WorkSafeBC Certificate of Recognition (COR). About one in five has achieved the Occupational Safety Standard of Excellence (OSSE). Fewer have an internationally-recognized safety certifications, such as ISO 14000 (13%) or OHSAS 18001 (6%).

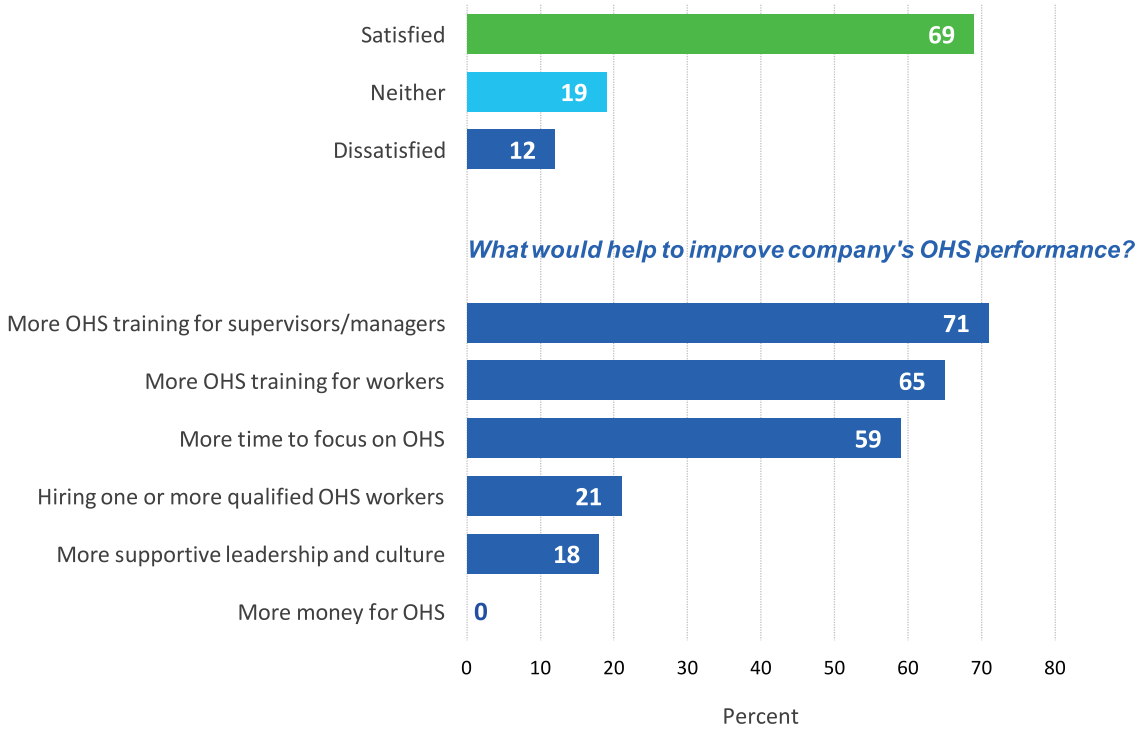
Figure 32: Percentage of companies with safety certifications



It is difficult to draw conclusions from these findings given the lack of any industry-wide safety certification benchmarks. However, three safety certifications – COR, OSSE and ISO 14000 – have established themselves within BC's manufacturing sector, providing a solid foundation for involving more firms in the safety certification process. COR (Certificate of Recognition) is a WorkSafeBC program that encourages firms in any industry to implement an OHS management system that exceeds legal requirements, with the goal of improving workplace safety and reducing lost-time injuries and fatalities. OSSE adapts the COR process to manufacturing firms and is offered by the Manufacturing Safety Alliance of BC, in cooperation with WorkSafeBC. ISO 14000 is a series of environmental management standards developed and administered by the International Organization for Standardization.

When asked to assess their company's overall OHS performance, two-thirds of survey respondents (69%) were either satisfied or very satisfied (Figure 33). Only 12% were dissatisfied or very dissatisfied. Of those who were dissatisfied, three things would help to improve their company's OHS performance: more OHS training for supervisors and managers; more OHS training for workers; and more time to focus on OHS issues. Hiring a qualified OHS worker is considered far less helpful, mentioned by only 21% of respondents dissatisfied with their company's OHS performance. Focus group discussions reinforced these points.

Figure 33:
Satisfaction with company's overall OHS performance and, if dissatisfied, what would help to improve it?



6.2.3 OHS training and professional development

Figure 34 documents OHS training and professional development. About three-quarters (73%) of companies surveyed provided OHS training to their employees in 2016. The groups most likely to receive training are all employees, members of joint health and safety committees, new hires, and managers and supervisors. Half (51%) of the companies providing this training evaluated its impact, and most of these (63%) used evaluation results to make improvements.

In terms of support for OHS education and professional development, one in five companies provided employees with financial support for courses leading to an OHS degree, diploma or certificate in 2016. And one in four provided employees with financial support in 2016 for professional development courses required to maintain an OHS certification.

Figure 34: OHS training, professional education and development, and future training needs

OHS TRAINING	
Companies provide OHS training for employees in 2016	73%
Groups receiving that training:	
All employees	40%
Members of joint health and safety committee	30%
New hires	29%
Managers/supervisors	27%
Front-line workers	24%
Employee safety rep	15%
Training evaluation:	
Companies evaluated effectiveness of this training	51%
Made (or plans to make) training improvements based on this evaluation	63%
OHS EDUCATION & PROFESSIONAL DEVELOPMENT SUPPORT	
Provided employees with financial support for courses leading to an OHS degree/diploma/certificate in 2016	20%
Provided employees with financial support for professional development courses required to maintain OHS certification in 2016	25%
FUTURE OHS TRAINING NEEDS	
Company has employees who could benefit from OHS training in a language other than English	19%
Respondent considers it 'important' or 'very important' for employees to acquire additional skills and knowledge in order to achieve company's OHS goals	76%

6.2.4 OHS practices contributing to improved safety performance

Research literature emphasizes that a rigorous OHS management system and an embedded 'safety culture' improve a firm's safety performance. While focus group discussions confirmed these points, other than the UBC study discussed earlier there is little quantitative evidence of this for manufacturing industries in BC.

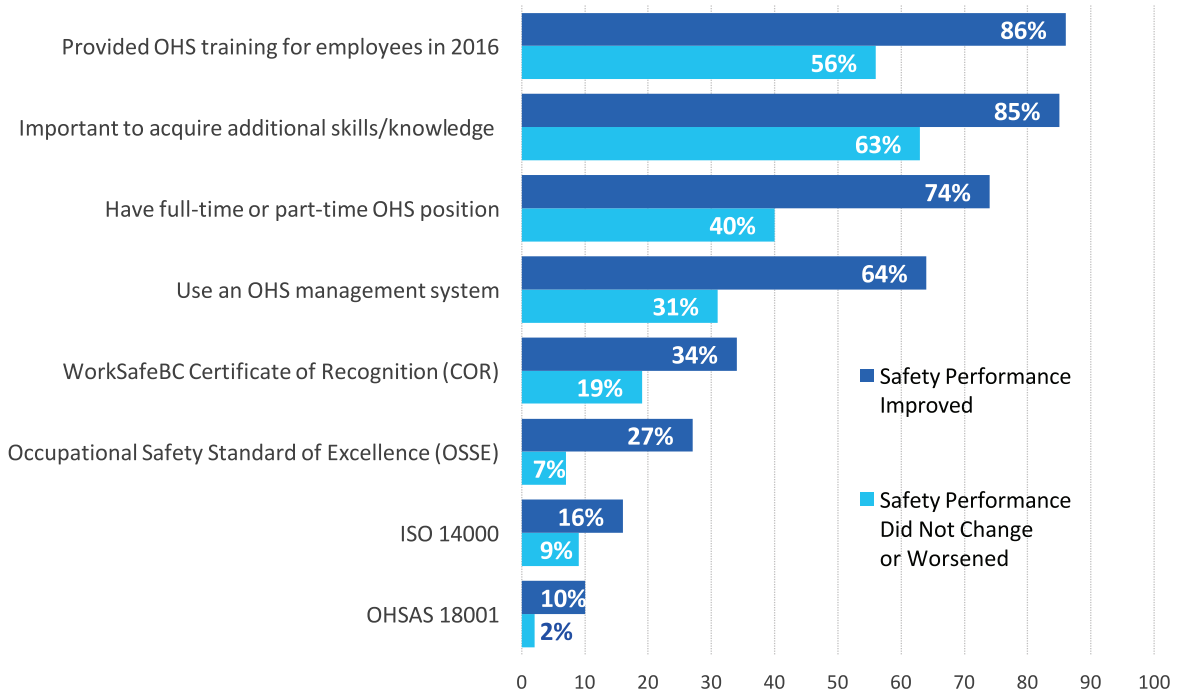
Survey results help to address this information gap by providing a perspective on the role of OHS professionals, training, and management systems to help reduce the frequency and severity of lost-time injuries. Further analysis of survey data was able to answer an important question: Is a company's safety performance, based on changes over the past three years in the number and severity of lost-time injuries, related to its use of specific OHS practices? To answer this question, two groups of companies were compared – those with improved safety performance over the past three years; and those with no change or worsening safety performance in the same period – looking for differences in their use of the following OHS practices:

- Employs a full-time or part-time OHS position.
- Uses an OHS management system.
- Provided OHS training for employees in 2016.
- Important for employees to acquire additional OHS skills and knowledge over the next five years for the company to achieve its safety goals.
- Has the Occupational Safety Standard of Excellence Certificate (OSSE).
- Has the WorkSafeBC Certificate of Recognition (COR).
- Has the ISO 14000 safety certification.
- Has the OHSAS 18001 safety certification.

Figure 35 presents the results of this analysis. To answer the question posed above, improved safety performance is associated with the use of these safety practices. Improved safety performance is associated with providing OHS training for employees, having a dedicated OHS position, and using an OHS management system. For example, 86% of companies with improved safety performance provided OHS training for their employees in 2016, compared with 56% of those whose safety performance did not improve. Most relevant to this study's focus on OHS professionals is the finding that 74% of the firms with improved safety records have a full or part-time safety position, compared with 40% of the firms that had no change or a decline in their safety record. This is clear evidence of what the American Society of Safety Engineers calls the 'value proposition' of an OHS professional for BC manufacturers.

Figure 35 also provides new information about the benefits of an OHS management system. It documents that 64% of firms with improved safety records during 2014 to 2016 have an OHS management system, compared with 31% of the firms reporting no change or a decline in safety performance.[73] This explains why companies that have achieved specific certifications for their OHS management system – such as COR, OSSE, ISO 14000 or OHSAS 18001 – are more likely to have improved safety performance. This finding corroborates a UBC study, which found small reductions in injury rates between 2007 and 2012 among the COR-certified firms.[74]

Figure 35: Comparison of the safety practices in two groups of companies – those with improved safety performance over past 3 years and those with no change or worse safety performance over the past 3 years*



The survey documented respondents' overall satisfaction with their company's safety performance, thinking that this might be a good 'proxy' for more objective safety measures. However, there was no difference in actual safety performance during 2014 to 2016 and the respondent's satisfaction with this performance. This could mean that using the above practices actually raises OHS performance expectations within firms.

73 There were too few respondents to include CSA Z1000 in this analysis.

74 UBC School of Population and Public Health. Partnership for Work, Health and Safety. An audit-based occupational health and safety recognition program: Is certification associated with lower firm work-injury rates? pwhs.ubc.ca/research/policy-and-program-evaluation/certificate-of-recognition-audit-program

6.2.5 Variations in safety practices by firm characteristics

The survey documents how safety practices vary by a firm's size, industry sub-sector and location. Specifically, survey results shed light on whether there is any relationship between firm characteristics and seven indicators of experiences with OHS professionals:

1. employing a full- or part-time OHS worker;
2. having recruited for an OHS position in the past two years;
3. difficulty recruiting for this position;
4. having trained an existing employee to fill an OHS position;
5. turnover among OHS workers in the past two years;
6. unfilled OHS positions; and
7. plans to recruit for an OHS position in the next five years.

There are no statistically significant differences on these seven indicators based on a company's industry group (3-digit NAICS) or the survey respondent's geographic location in BC. The number of worksites a company operates (one worksite in BC only, multiple worksites in BC, one BC worksite and one or more outside BC, multiple locations inside and outside BC) is associated with six of the seven indicators; there was no difference for training existing employees to fill OHS positions.

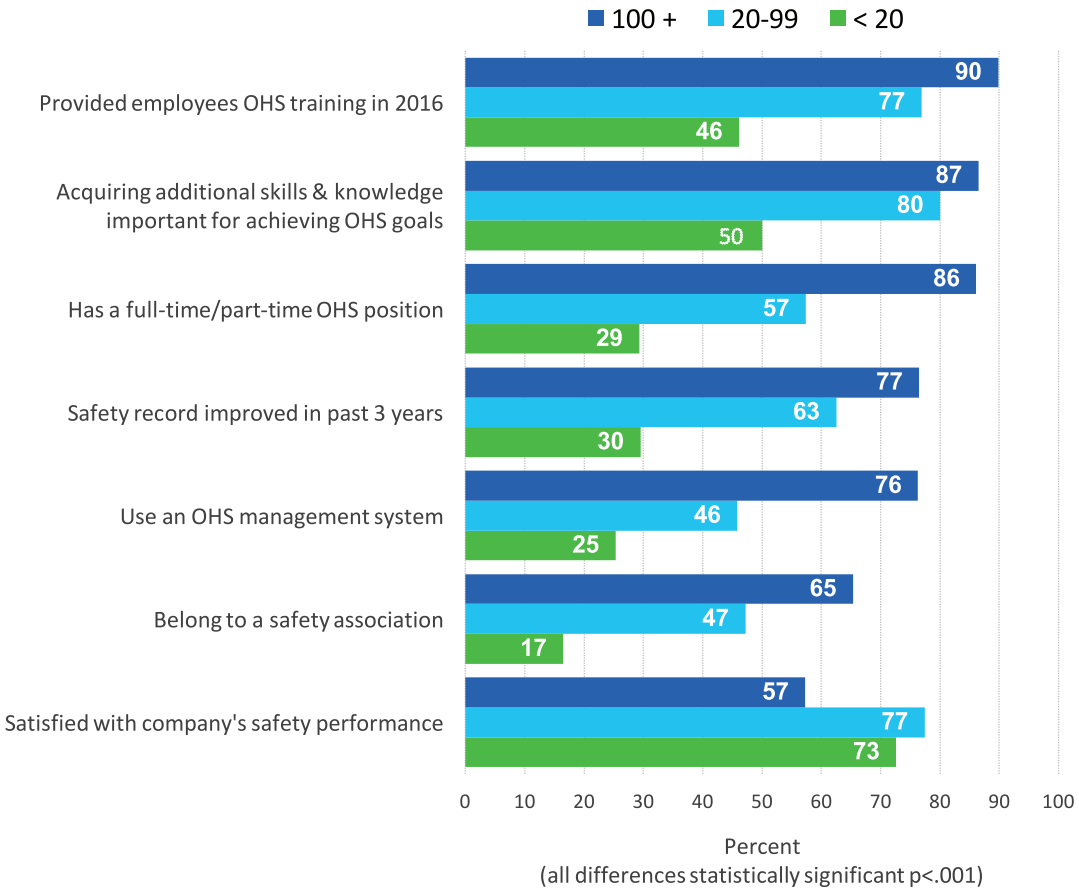
Firms operating at multiple locations inside and outside BC are more likely than firms with only one BC location to employ an OHS worker, to have attempted recruiting for an OHS position in the past two years, and to be planning to recruit for such a position in the next five years. This reflects firm size, given that multi-location firms are large ones. Looking at firm size, on all seven of the above indicators large firms are significantly more likely than small or medium-size ones to be employing, recruiting or internally training OHS personnel.

Firms with all their BC worksites unionized, compared to other firms, also are significantly more likely to be employing OHS personnel and to have recruited for an OHS position in the past two years. These findings for unionization are closely related to firm size, given that large firms are more likely to be unionized. Figure 36 show the substantial differences between small, medium and large firms in OHS practices and performance. Large firms are far more likely than medium and small firms to provide employees with OHS training, agree that acquiring more OHS skills and knowledge is important for achieving OHS goals, have an OHS position,

report an improving safety record, use an OHS management system, and belong to a safety association. Note the one interesting exception to this pattern: large firms are less satisfied than medium or small ones with their safety performance. This reflects large firms' more extensive safety resources and the higher priority placed on workplace safety, which raises safety performance expectations. The fact that medium-size firms are more satisfied with their safety performance than smaller or larger firms should be a concern, given their higher lost-time injury rate. This higher satisfaction could result in less action to improve safety.

Turning to regional variations, there are no significant differences between firms surveyed in the lower mainland, Vancouver Island and the Coast, Thompson Okanagan and the north on any of the OHS factors reported in Figure 36.

Figure 36: OHS practices and performance by company's workforce size



Focus groups and interviews did reveal differences in local manufacturing 'eco-systems' that can influence OHS performance. These ecosystems include labour markets for OHS personnel, access to OHS consultants and post-secondary programs, and other resources such as WorkSafeBC and Manufacturing Safety Alliance of BC safety advisors. Nanaimo firms described particularly helpful local WorkSafeBC personnel. The Okanagan has an active safety advisor employed by the Alliance, who sat in on the focus group there. In Prince George, the availability of an OHS certificate program through the University of Northern BC, taught by reputable local trainers, provides a local resource. There is also a good supply of qualified OHS professionals from Alberta's energy sector looking for work in the region.

Focus groups in Nanaimo, Kelowna and Prince George also communicated a need for more local networking opportunities for manufacturers to discuss OHS issues. As suggested by focus group participants, regular meetings would provide opportunities for individuals with OHS responsibilities to learn from each other, as well as for the Alliance to provide short training sessions designed to meet local needs.

6.3 Summary

- Safety culture is the foundation for a safer workplace. Clear guidelines for promoting safety cultures in manufacturing could be included in on-going training for workers in OHS roles. More extensive use of resources available in BC (such as the Organizational Performance Metric) will further the development of safety cultures in manufacturing.
- OHS training is a big enabler of workplace safety, and could be improved by incorporating more options for individual self-paced and internet based learning in short modules. Doing so would provide more opportunities for production workers to move into an OHS career.
- Health and safety management systems contribute to a safe workplace. The OHS profession's role in developing, implementing and sustaining these systems defines its 'value proposition'.
- Joint health and safety committees have a positive influence on a firm's safety performance. Members of the committee can act as safety champions in the workplace but require appropriate education, training, and resources to be effective.
- Companies that are BC Safety Charter signatories or members of a safety association are more likely to have dedicated OHS positions. The rate at which BC manufacturers become BC Safety Charter signatories or join safety associations in future could increase the demand for OHS professionals.

- Half of the manufacturing firms surveyed use an OHS management system. About a quarter or less have a safety certification, such as COR or OSSE. There is scope to expand the adoption of OHS management systems and safety certifications, especially considering that achieving a safety certification requires an OHS management system to be in place and is associated with improved OHS performance. Doing so could increase the demand for OHS professionals.
- About three-quarters of companies surveyed provided OHS training in 2016. But only half evaluated its effectiveness; this gap that needs to be addressed.
- Improved safety performance in BC manufacturing firms is associated with the use of a combination of effective safety practices, regardless of sub-sector or region. One of these practices is having a dedicated safety position. The use of an OHS management system is also related to improved safety performance.
- Large firms are significantly more likely than small or medium-size ones to be employing, recruiting or internally training OHS personnel, to be using other OHS effective practices, and to report improved safety performance.
- Further research is needed to better understand what influences the safety practices of medium-size firms, given their higher injury rates than either small or large firms.

7 BC's Manufacturers Future OHS Challenges

> ***This section documents the future OHS risks and challenges faced by BC manufacturers. The study's survey, focus groups and interviews provide a unique perspective on the kinds of OHS expertise and resources manufactures will require to improve workplace safety over the next five years.***

7.1 Survey findings on OHS challenges

The survey asked respondents about their firm's future training needs. About one in five respondents have employees in their workforce who could benefit from OHS training in a language other than English. And three-quarters consider it important or very important for company employees to acquire additional skills and knowledge to achieve safety goals.

Survey respondents were asked if they expected specific business changes in the next five years to create OHS risks for their company. Figure 37 shows that just over half of respondents identified two changes – company growth and new work processes – as posing future OHS risks. New production technologies were identified by 40% of respondents as a future risk. Just under a third identified new quality standards or new products as potential OHS risks.

When asked about other changes, not listed in Figure 37, that could create OHS risks, a wide range of factors were mentioned. Figure 38 provides a thematic analysis, showing that business changes (such as a change in management or moving to new premises) are of concern to 23% of the 44 respondents who answered this question. Three other factors were mentioned by just over 10% of these respondents: workforce aging; WorkSafeBC or other OHS regulatory changes; and new hires or young workers.

Figure 37: Changes expected to create OHS risks in next 5 years

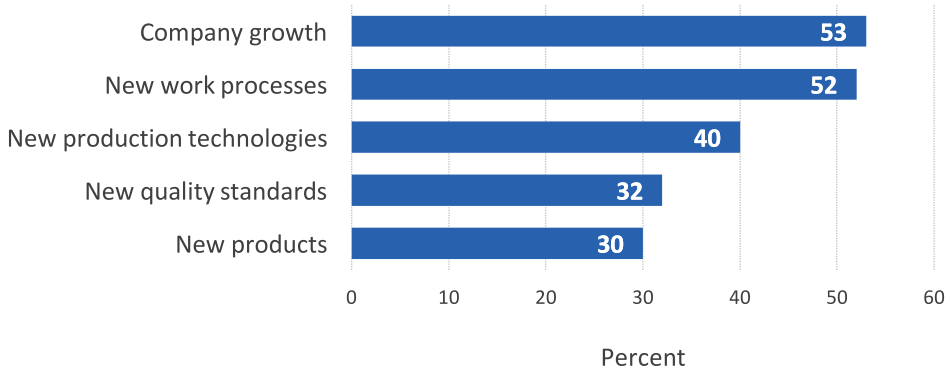


Figure 38: Other changes expected to create OHS risks for companies in the next 5 years (n=44)

THEME	(n)	%	Examples	
Business changes/ challenges	10	22.7	Change in management.	We will need to move to a bigger premises as we outgrow our current building. A new location will no doubt bring with it new hidden dangers.
Workforce aging	6	13.6	Retirement of employees with safety knowledge; new employees will not have this level of knowledge so we will have to train and monitor to a higher degree.	Aging workforce means more hiring soon.
OHS/WorkSafeBC policies/regulations	5	11.4	Unreasonable or convoluted WorkSafeBC policies - their policies tend to be written to leave a lot to interpretation.	Only thing I can see is that OHS is going to have environment integrated more and more each year.
New hires, young workers	5	11.4	Any new hire is a potential risk. Especially the young as they do not have good work ethic overall.	New and young workers. Skills and knowledge as well as site specific common sense are retiring.
Specific OHS challenges	4	9.1	More staff could mean additional risk, but will likely be mitigated by the creation of a Joint Health and Safety Committee.	We contract for large companies - developing custom training for them and often visiting their operations to gather images, video, etc. OHS risks for our staff arise when we have contractors unfamiliar with OHS policies/procedures of the hosting company on-site.
New equipment/ technology	4	9.1	New equipment to introduce a new process in our system will inevitably create new risks that will need to be addressed.	All changes in technology requires us to address possible changes in OHS risk.
Other	4	9.1	Accidents will happen unfortunately, no matter how much you educate people. That is the biggest thing and fear of an employer.	Not that I know of; very small company and a lot of things cannot apply to our small business.
Training	2	4.5	Lack of skilled workers in the industry means more training	More training.
Workforce mental health issues	2	4.5	Increasing numbers of workers with mental disorders.	Mental health issues relating to the workers personal life being brought to the workplace.
New products/ processes	2	4.5	Currently developing new manufacturing processes that could impact employees	Production of different products from those currently produced....use of unfamiliar ingredients or processes.
Total	**44**	**100%**		

Respondents were also asked to describe the greatest health and safety challenge their company will face in the next five years (Figure 39). The following five challenges were each mentioned by about one in ten of the 184 respondents who provided written answers to this question:

1. an aging workforce;
2. adapting to business changes and growth;
3. creating a safety culture;
4. providing OHS education and training; and
5. a number of company-specific OHS risks.

Figure 39: Greatest health and safety challenge company faces in the next 5 years (n=184)

THEME	(n)	%	Examples	
Aging workforce	22	12.0	Aging work force in an ever changing work environment where increased workload and tighter deadlines increase the risk of ergonomic issues and longer recovery times.	Retirement. Will need to concentrate on training additional employees on our OHS program
Adapting to business growth/change	22	12.0	Balancing production pressure with safety and adapting to rapid change.	Growing and being too busy to improve OHS.
Creating a safety culture	21	11.4	Creating a culture where employees are aligned on safe work behavior and responsible care (for each other).	Getting buy-in to make the (contentious) safety changes necessary to accelerate the safety culture improvement desired.
Training/ education	19	10.3	Training will be our greatest health and safety challenge since the company is a unionized company. The cost for employee training is a huge expense.	Training young workers who are new to the manufacturing environment.
Specific health and safety risks	17	9.2	Heavy lifting, loading & unloading trucks & vans, rigging, raised platform safety, working from ladders. Some electrical safety as well.	Ergonomics for office workers.
Effectively implementing and maintaining OHS programs/systems	14	7.6	Implementation and execution of existing H&S programs and systems.	Consistency in applying safety guidelines.
Young workers/ new workers/ workforce growth	14	7.6	Influx of new, young employees.	New employees in our shop must be adequately trained and make sure they follow all our safety standards.

THEME	(n)	%	Examples	
Worker attitudes and behaviours	13	7.1	Complacency. Focus on statistics rather than on safe work practices.	Our greatest challenge (in my view) continues to be long serving employees who are proud of their historical cuts and stitches and some of the risky behaviours they engaged in. They view H&S paperwork as an inconvenience. This rubs off on new employees.
Meeting OHS standards, regulations	13	7.1	Increasing expectations from WorkSafeBC (i.e., more required training) without providing resources for the newly required training.	New Regulation and compliance requirements.
None	7	3.8	We operated more than 15 years, nothing happened in the past. There is low risk for health and safely challenges in my company.	Nothing we can't handle.
Senior management/ owner support	7	3.8	Accountability from senior management in terms of supporting positive H&S culture change.	Getting management to fully embrace the importance of an OHS program
Improving safety record/reducing long term injuries (LTIs)	6	3.3	Continuing to improve our safety record in the large project environment we operate in- see comment above.	Lowering injury rate and enforcing a return to work program.
Money/resources for OHS	4	2.2	Making sure that we have the resources to allocate manpower to OHS.	Change is always related to cost. The company owner will not approve a budget for such activities.
Employee retention and recruitment	3	1.6	Finding qualified staff that are versatile.	Retaining employees: we use a lot of temporary workers and they come and go.
Other business-related challenges	2	1.1	Trying to stay in business.	Trying to stay in business while WorkSafeBC demands ridiculous tests and procedures that are outrageously expensive and add no safety value to our company.
Total	**184**	**100%**		

Nine 'other' risk categories were mentioned by 8% or fewer respondents. Along with the range of challenges noted, most of the challenges are within the company, which suggests they could be effectively managed. The resources required to address future OHS challenges are described in Figure 40. About one in four (27%) of the 177 respondents mentioned OHS training and education. Fewer (15%) stated that hiring an OHS professional would do the most to address future OHS challenges. Among the other resources mentioned, relatively few respondents view time or money as key requirements for meeting future OHS challenges. Even fewer mentioned working with an OHS partner, such as the Manufacturing Safety Alliance of BC or WorkSafeBC, as required to meet future OHS challenges.

Figure 40:
Most important resource companies will need to meet the biggest OHS challenge they will face in the next five years

THEMES	(n)	%	Examples	
Training/education	47	26.6%	Training on keeping active and flexible as they age and our processes become more automated and less physically demanding on them.	Young worker OHS resources to educate and train workers on best practice.
OHS professionals/ staff/expertise	27	15.3%	Full time Safety Coordinator who knows the regulations, can train employees, who knows how to translate policies into language all employees can understand, time to train employees, high cost of training.	The number of our employees is forecast to grow with the business. So the most important OHS resource would be to have a full time Health & Safety coordinator.
Nothing/Don't know	13	7.3%	We are a small business and we have enough resource right now.	We have a mentoring program with new employees, which has helped. We do spend the time in training the employees and getting sign offs.
Changes / improvements in OHS system	12	6.8%	Continued vigilance in providing education on correct lifting techniques and in ensuring work tasks are varied to prevent repetitive injuries. A continued focus on providing lifting devices and equipment.	Well detailed SOPs with full hazard assessment will be the most useful piece to ensure safety standards are not only maintained, but improved.
Senior management support/ commitment	10	5.6%	Senior management commitment to the program.	An understanding of leading indicators to enable leadership behaviors to drive safety culture.
Time	9	5.1%	Time commitment for dedicated personnel and money to complete upgrades	Time. Need the time to be able to focus on the training and follow up to reinforce the culture requirements.
Safety culture	9	5.1%	Knowledge and training in how to improve the safety culture.	Employees embracing a Culture of Safety, mentoring the young workforce to observe the balance between safe work and productivity.
Leadership from front-line supervisors/ managers	7	4.0%	Front line supervision. The people that work with/supervise the workers are critical for the dissemination of safety policies/ procedures but especially for setting the safety culture and expectations	The most important resource we will need is the continuing efforts of our supervisors to ensure all elements of our safety program are followed.
Specific OHS initiatives	7	4.0%	Find ways to reduce fatigue due to repetitive work, reduce OT.	Our company will need machinery for heavy lifting and repetitive tasks.
Money	6	3.4%	Putting money into new equipment and training.	Financial & manpower as our company is a small firm.
Workforce aging	6	3.4%	Managing aging workforce.	Proper succession planning.
Better workforce/ human resource management	6	3.4%	Trying to stay in business.	Automation.

THEMES	(n)	%	Examples	
Other	4	2.3%	Commitment at all levels.	On the ground presence. Commitment from managers, supervisors, JOHSC, employees, WCB Network / BC Safety Charter /Safety Association.
Commitment	4	2.3%	Easily accessible information that is sector specific.	Good information about where we are with respect to other companies and good information for training purposes
Relevant OHS information/knowledge	4	2.3%	Easily accessible information that is sector specific.	Good information about where we are with respect to other companies and good information for training purposes
OHS management system	3	1.7%	Create a working OHS program for ourselves, which has never been present in the 40+ years the business has been in operation. We've begun this process now but the scope is larger than anticipated when starting completely from scratch	Having a good safety program and safety professional in place.
Work with OHS partners	3	1.7%	WorkSafeBC recommendation and help of Manufacturing Safety Alliance of BC.	Engage with partners/clients prior to site visits and research their OHS policies.
Total	**177**	**100%**		

There are big differences by firm size in respondents' assessments of future OHS risks. These follow the same pattern as described above for OHS personnel, practices and performance. For example, 70% of large firms expect company growth to create OHS risks over the next five years, compared with 52% of medium-size and 34% of small firms. The fact that just over half of medium-size firms expect growth-related OHS risks to increase should be cause for concern, given that this group of firms now has higher injury rates than small or large firms.

7.2 Focus group and interview findings on future OHS challenges

Future OHS challenges identified in the survey were also raised by focus groups and key informants. As already noted, the increasing turnover and recruitment created by an aging workforce will present manufacturers with a range of challenges related to providing new workers with appropriate safety training. However, there was no mention of the retirement of OHS personnel presenting problems for manufacturers in the next five to ten years.

Of all the effective OHS practices identified in the research and documented in the survey, training stands out as a priority. Focus groups and interviewees emphasized the need for more training that is easily accessible, easy to deliver and appropriate to the needs of each company and its workforce. As previously noted, survey respondents whose firms had experienced no change or a decline in their safety performance identified more training at all levels – managers, supervisors and front-line workers – as necessary to improve OHS. Focus groups also emphasized the critical role of supervisors in promoting safety thinking and behaviour, with the solution being more and better supervisor training.

Regarding the future role of OHS professionals, it is widely accepted that employer demand for OHS personnel will grow due to increasing regulatory requirements. However, several barriers could present challenges for manufacturing employers. The cost of an OHS professional can be a barrier for small and medium-size firms, leaving a gap in OHS expertise which will require increased access to WorkSafeBC, safety association and OHS consultant resources. Ensuring that these resources are locally available and accessible, especially by small firms, is both a challenge and an opportunity to support further safety improvements.

One focus group participant succinctly stated the challenge employers face trying to recruit an OHS professional: “There are too many safety designations and no standards.” With standards increasing, interviewees identified the BCRSP’s increased educational requirements in 2018 as a significant challenge for post-secondary institutions that now provide OHS certificates and diplomas. These points made by focus groups underscore the need for consistent standards for OHS designations. Moving in this direction would not only facilitate decision-making on which educational programs and certifications to choose for individuals considering an OHS career, it also would enable employers to assess the suitability of applicants for OHS positions.

OHS certificates are more common than OHS diplomas or degrees in the manufacturing sector. Given that sizeable numbers of OHS personnel working in manufacturing entered their position mid-career as adult learners by completing a short certificate program, the ratcheting up of professional standards could reduce future opportunities for this sort of OHS career path. While the impact of these changes on the supply of OHS professionals in BC is unknown, they will be occurring at a time of increased demand in the manufacturing sector for OHS expertise.

7.3 Summary

- There is an acknowledged need for additional OHS training. Three-quarters of survey respondents consider it important for employees to acquire additional skills and knowledge to achieve safety goals. One in five respondents has employees who could benefit from OHS training in a language other than English.
- Company growth and new work processes are business changes presenting the greatest future OHS risks. In contrast, new automated technologies have the potential to improve workplace safety. It will be especially important for project partners to monitor how growth affects the safety practices and performance of medium-size firms, given their relatively high lost-time injury rate.
- Other prominent OHS challenges manufacturing firms expect to face include workforce aging, creating a safety culture, and providing OHS education and training. Adequately addressing all three will be essential if companies are to achieve workplace safety improvements. Almost all challenges mentioned by manufacturers are within the ability of company management to influence.
- Few respondents see hiring an OHS professional as essential for addressing future OHS challenges.
- The overall demand for OHS professionals is expected to grow. This will happen at the same time as professional standards are rising, with uncertain consequences for the supply of these professionals. Efforts by project partners to develop consistent educational and certification standards for OHS professionals could facilitate an increased use of these professionals by BC manufacturers.

8 Conclusions

8.1 Summary of key findings

Implications of manufacturing sector trends for OHS:

- An aging and more diverse workforce and sector growth will create increasing challenges in terms of training new workers on safe work practices.
- Firm growth could increase demands on firms to provide OHS orientation and training.
- Automated production processes have the potential to improve safety because of the training programs associated with new equipment and reduced worker contact with machinery.
- Increasing workforce diversity may require new approaches to OHS training. This will include OHS for workers who speak English as a second language and new approaches to learning.
- Many more workers are employed in larger manufacturing firms, suggesting that targeting larger firms with OHS initiatives will reach a greater number of employees.

OHS competencies and qualifications:

- The term 'OHS professional' is difficult to define. There is no consensus on the body of skills and knowledge, professional designations or credentials required to be an OHS professional in Canada. No specific OHS professional qualification is considered essential for an OHS role in manufacturing. However, moves to standardize OHS credentials at a higher level could transform Canada's OHS education and certification landscape over the next five to ten years.
- OHS practitioners in BC manufacturing have a combination of a post-secondary certificate or diploma plus a professional certification and relevant work experience. OHS post-secondary program graduates appear to be able to find appropriate employment, although detailed information on labour market outcomes is lacking.
- A common path into the OHS profession in BC manufacturing is through a mid-career move. Existing BC post-secondary certificate programs and shorter OHS designations are suited to these adult learners. However, the lack of consistency and standards in OHS education and certification make it difficult to identify the specific steps someone would need to take to successfully make this career transition into an OHS role.

The OHS workforce in BC manufacturing:

- Just over half of the companies surveyed employ a full-time OHS worker, most just one. These OHS personnel provide a wide range of support to improve safety performance.
- Firms are more likely to train an existing employee for an OHS role than recruit externally. Many workers in OHS positions have no formal OHS credentials.
- One in five survey respondents had an OHS worker leave in the past two years and about the same number recruited or attempted to recruit for an OHS position in the same period. This level of demand for OHS professionals with BC manufacturing is expected to remain the same for the next five years, based on hiring expectations.
- Based on recruitment and retention experiences, as well as internal development for OHS roles, there appears to be an adequate supply of qualified OHS personnel within BC.
- Survey respondents identified OHS knowledge, and experience in an OHS role as the two most important job requirements if they were recruiting for an OHS position. Specific OHS credentials, manufacturing industry work experience, and non-OHS skills are less important.
- However, focus group discussions emphasized the importance of soft skills (e.g., communication, leadership, mentoring) for success in an OHS role. It will be important to define the essential soft skills required by OHS professionals in manufacturing.

Future supply and demand in OHS occupation:

- National projections for OHS occupations show a balance of demand and supply between now and 2024. The British Columbia 2025 Labour Market Outlook projects 130 new OHS job openings annually over the 10-year projection period.
- The study's primary research findings are consistent with these projections. Firms in the survey expect to have a similar level of future recruitment activity for OHS positions as in the recent past.
- The overall demand for OHS professionals is expected to grow. OHS programs at BC's post-secondary institutions are expected to provide an adequate supply of qualified candidates for these positions.
- Manufacturers could meet this demand either through external recruitment or internal development of OHS expertise.
- Four trends could affect the labour market for OHS professionals in BC over the next five to ten years: the changing economic environment; higher standards for OHS certification, increased supply chain requirements for OHS management systems, and new WorkSafeBC regulations.

Effective OHS practices:

- Improved safety performance in BC manufacturing firms is associated with a combination of evidence-based effective safety practices, regardless of sub-sector or region. One of these practices is having a dedicated safety position.
- Large firms are significantly more likely than small or medium-size ones to be employing, recruiting or internally training OHS personnel, or to be using other effective OHS practices.
- Membership in a safety association and COR or OSSE certification are associated with recent improvements in safety performance.

BC manufacturers' future OHS challenges:

- There is a need to provide employees with additional OHS training in future in order to meet company OHS goals. This training should be evaluated to determine its effectiveness.
- Company growth and new work processes present the greatest future OHS risks. In contrast, new automated technologies have the potential to improve workplace safety.
- Other major OHS challenges manufacturing firms expect to face include workforce aging, creating a safety culture, and providing OHS education and training. Few respondents see hiring an OHS professional as a way to address future OHS challenges.

8.2 Implications for BC manufacturers and industry partners

- Given that OHS training is essential for workplace safety, its effectiveness could be improved by incorporating more options for individual self-paced and internet based learning in short modules. This could open new opportunities for production workers to move into an OHS career.
- Half of firms in the survey that provide training also evaluate it, and the evaluation results often lead to improvements in future training. Evaluation should be incorporated into all OHS training in order to determine if learning and behavioural change goals are being met, and to identify opportunities for improvements.
- The prevalence of mid-career transitions into OHS roles for manufacturing workers signals a continued and possibly growing need for certificate programs as a convenient route to upgrading OHS knowledge and skills. This presents an opportunity to develop manufacturing-specific courses that could meet some of the requirements for one or more existing OHS post-secondary programs.
- There is solid evidence that health and safety management systems contribute to a safe workplace. Encouraging manufacturers to adopt any OHS management system through safety certifications is one pathway to improved OHS performance. The rate at which OHS management systems are introduced could increase the demand for OHS professionals.
- Joint health and safety committees have a positive influence on a firm's safety performance. To be effective, committee members require appropriate education and training, must feel empowered, and need resources and capabilities to monitor leading safety indicators.
- The availability of regionally-based safety advisors, either from WorkSafeBC or a safety association, is crucial for small and medium-size firms (SMEs) to acquire the OHS expertise they require to implement OHS management systems, provide employee training and embark upon a safety certification process. Shared resources among several SMEs as well as opportunities to network with other local manufacturing firms can contribute to improved safety performance.

- Helping senior management understand the value of OHS – and the crucial role that OHS professionals play in delivering that value – is an on-going challenge, not only in BC but across Canada, in the US and in Europe as well. There are several ways that project partners can address this challenge. Needed is a clear statement of an OHS 'value proposition' for BC manufacturers, which essentially will define the core competencies of an OHS professional in manufacturing. These core competencies should include relevant soft skills.
- Also required is on-going education and awareness-raising efforts, especially targeted at SMEs. Medium-size firms, in particular, require special attention given the inconsistency between their satisfaction with safety performance and high lost-time injury rates. It may be helpful in this regard to approach OHS as a quality improvement initiative. Just as for product quality, it is essential to design safety into all aspects of the production process.
- As part of these efforts, project partners could develop easy-to-use diagnostic tools for SMEs that identify where a company is at on its journey to a safer workplace, if the firm's leaders are ready to take the next step, and the best opportunities for actually doing this.

8.3 Issues for future research

- It will be important for project partners to monitor the international and national trend toward standardized and higher-level OHS credentials, especially to document the impact on OHS education and certification in BC over the next five to ten years. In this regard, it would be useful to know the extent to which different post-secondary OHS programs in BC provide a common body of knowledge, as well as the labour market outcomes of heir graduates.
- Further research is needed to document the specific combination of knowledge, skills and experience that best meets the OHS needs of manufacturers. This would include a clear definition of the essential soft skills that OHS professionals require to lead safety improvements.
- The lack of a centralized database on the number of OHS practitioners and their OHS certifications and post-secondary credentials is a significant labour market information gap. Systematically tracking this information in BC would assist industry, post-secondary institutions, as well as safety and industry associations with future labour market plans.
- The recruitment and retention of OHS personnel could be improved if more was known about these processes. Specifically, what explains the relatively high dismissal rate of these workers? Is this a result of employers' lack of information about the OHS labour market which makes it difficult to adequately screen applicants, poorly qualified recruits, lack of 'fit' with the organization's culture, or some other reason? Furthermore, why do companies pursue an internal development strategy for OHS positions rather than relying on external recruitment? And do firms that have internally developed OHS personnel differ in their safety performance from other firms that externally recruited for OHS roles?

- Given that only half of the firms providing OHS training evaluate its effectiveness, addressing this gap could help to improve the quality of future training. WorkSafeBC's new training requirements for worker health and safety representatives and joint health and safety committees provide an opportunity to develop an evaluation framework that meets the needs of the manufacturing sector.
- Safety association membership and certified OHS management systems, particularly COR and OSSE, are associated with a range of effective safety practices and improved safety performance. These research findings provide a starting point for a deeper investigation of the barriers and enablers of manufacturing firms participating in safety associations and adopting OHS management systems.
- A stronger safety culture could be encouraged in BC manufacturing firms by the use of available diagnostic tools, in particular the Organizational Performance Metric now recommended by WorkSafeBC. The safety performance of manufacturing firms could be improved if OHS professionals and managers had a better understanding of the actions required to build a safety culture.

Appendices

Appendix A:
Sector Labour Market Partnership Steering Committee Membership

Dale Walker,
VP Employer, Industry and Worker Services, WorkSafeBC

Dan Reader,
Chair BC Advisory Board, Canadian Manufacturers and Exporters

Daneen Skilling,
National Environmental, Health & Safety Manager, Andrew Peller Ltd.

Gareth Jones,
Acting President and CEO, Canadian Centre for Occupational Health and Safety

Andrew Wynn-Williams
Divisional Vice President, BC, Canadian Manufacturers and Exporters

James Donaldson,
CEO, BC Food Processors Association

Kevin Thorburn,
Supply Chain Manager, Nestle Waters Canada

Sharmen Lee,
Dean, BCIT School of Health Sciences

Lisa McGuire,
CEO, Manufacturing Safety Alliance of BC

Paul Barton,
Teamsters Union

Renata King,
Director, Business Development, Northern Development Initiative Trust

Sandra Oldfield,
CEO and President, Tinhorn Creek Vineyards

Scott Bax,
Senior Vice President Operations, Pinnacle Renewable Energy Inc.

Wayne Tebb,
Dean, Kwantlen Polytechnic University School of Business

Appendix B:
Survey Methodology and Questionnaire

B.1 Survey methodology

An on-line survey provided the main source of primary labour market information. The survey targeted key contacts in manufacturing firms (either individuals in an OHS position or managers knowledgeable about the company's OHS practices) on the following topics:

- their role in the company;
- company and workforce characteristics;
- OHS roles in the company;
- OHS professional recruitment and retention experiences and recruitment plans;
- OHS credentials possessed by workers in OHS roles;
- company safety practices;
- OHS training in the company;
- the company's future OHS challenges and needs; and
- respondent's demographic details.

The on-line survey was conducted during a six-week period (January 9th to February 17th, 2017). Respondents were able to enter a prize draw after submitting their completed survey, using a secure page on the Manufacturing Safety Alliance of BC's website. Offering incentives is a common practice in survey research to increase response rates. Prizes were donated free of charge by project partners.

Potential respondents were drawn from two separate sources: the Manufacturing Safety Alliance of BC's contact list; and manufacturing contacts provided by three project partners.

Alliance contacts: Potential respondents on the Alliance's list received personally addressed emails with a secure link to the survey, which only they could use. This enabled the survey software to track anonymously who had responded, so that weekly reminder emails went only to non-respondents. A total of 1,494 valid email addresses were sent the personalized invitation to the survey, yielding a total of 275 useable responses for a response rate of 18.4%, exceeding the target response rate of 10-15% for the Alliance's contacts.

This target was based on an 11.8% response rate to a February 2016 Alliance member survey and a 15% response rate to a UBC study of Leading OHS Indicators in the BC manufacturing sector.

Project partner contacts: Three of the project partners (Canadian Manufacturers and Exporters, BC Division; Northern Development Trust Initiative; and Surrey Board of Trade) contacted their manufacturing members via email, providing a brief description of the project and a direct link to the survey, which anyone could use to access the survey. This approach did not allow researchers to track survey responses, so the three partners could not send regular reminder emails targeting only non-respondents. However, two of the partners sent one general reminder to everyone on their contact list. While the response rate to the open link survey was relatively low, when added to the Alliance responses the total survey response rate was 10.4%.

Figure B1 provides details of the survey samples and final response rates.

Partner Name	Initial contact list	Bounce-backs	Valid emails delivered	TOTAL survey responses	Total useable responses	Alliance useable responses
Manufacturing Safety Alliance of BC	2,030	536	1,494	292	275	275
Northern Development Trust Initiative (manufacturing members only)	322		322			
Surrey Board of Trade (manufacturing members only)	249	19	268			
Canadian Manufacturers & Exporters, BC Division (manufacturers only)	1,024		1,024	65	47	
Total survey invitations delivered	**3,625**	**555**	**3,108**			
Survey responses				**357**	**322**	**275**
RESPONSE RATES					**10.4%**	**18.4%**

Every effort was made to contact all individuals for whom we had current emails on the Alliance list and the list of manufacturing members of its three partners. The Alliance list was updated with current emails throughout the survey period. The goal was to maximize the number of respondents to the survey. In other words, we surveyed the population of manufacturing members in the Alliance and its survey partners, rather than drawing a probability sample.

Because this is a population-based survey, sampling statistics such as confidence levels and intervals are not relevant. Nonetheless, the diversity of individuals and firms responding to the survey provides a reasonable representation of those personnel responsible for or knowledgeable about OHS in their firm. The distribution of respondents' firms by size, geographic location and industry sub-sector reflects a diverse range of OHS personnel, practices and needs.

B.2 Profile of survey respondents

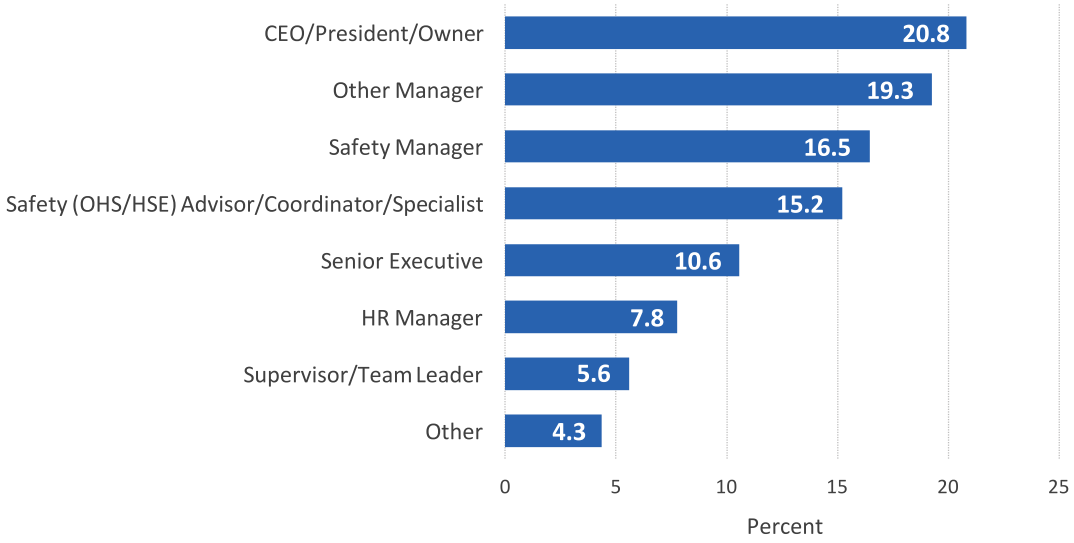
Figure B2 profiles the survey's respondents. Briefly, 58% are male, most are 40 years and older, and just over half work in the lower mainland.

Figure B2: Demographic profile of respondents

Gender	**%**	**n**
Female	27.3	88
Male	57.8	186
Prefer not to answer	2.5	8
Age		
16-24	1.9	6
25-39	20.8	67
40-54	40.1	129
55+	25.5	82
Region in which respondent works		
Lower Mainland	55.6	179
Thompson Okanagan	13.4	43
Vancouver Island & Coast	9.9	32
Cariboo	3.7	12
Nechako	2.5	8
Northeast	1.6	5
North Coast	1.0	3
Total respondents = 322. Item n's may be less than this due to item non-responses.		

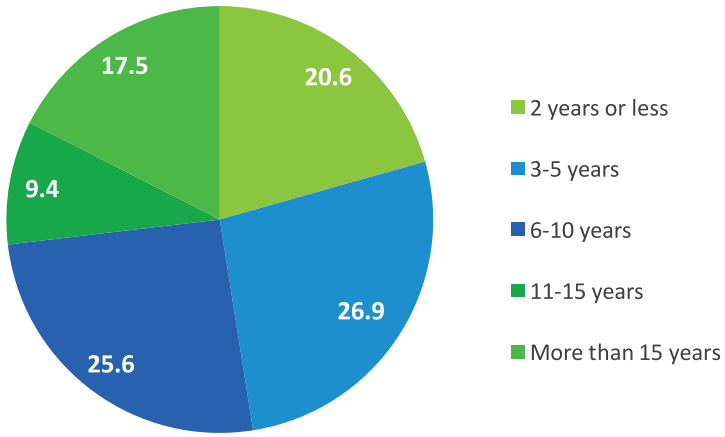
Figure B3 reports their current position. One in five is CEOs, Presidents or Owners and another 11% are senior executives. Close to one in three is in OHS positions, either as safety managers or OHS/HSE advisors, coordinators or specialists. Only 8% of respondents are HR managers.

Figure B3: Respondent's current position



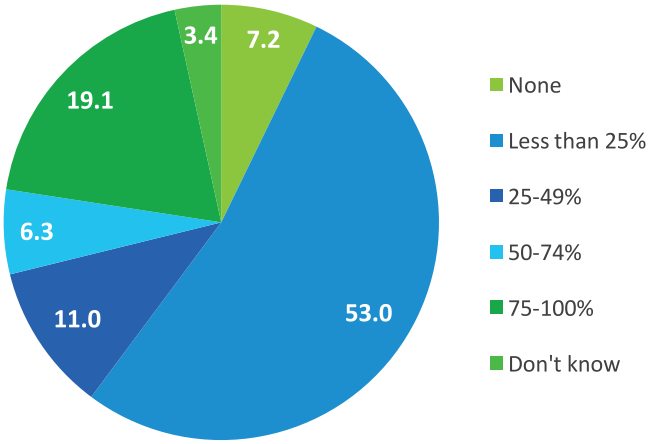
Respondents' time in the job covered a wide range (Figure B4). One in five had less than two years in their current position at the time of the survey, just over half had been in their job between three and ten years, and slightly over one in four had ten or more years in their job.

Figure B4: Respondent's years in current position



The largest group of respondents (53%) spends less than 25% of their time on OHS matters in a typical week. The few (7%) who spend no time on OHS matters are CEOs or owners. And 19% spend between half and three-quarters of their week dealing with OHS.

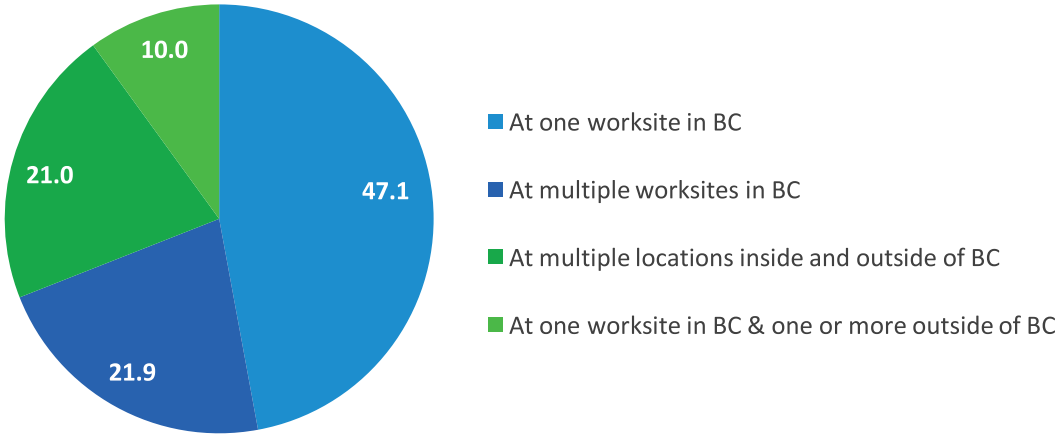
Figure B5: Amount of time respondents spend in OHS in a typical work week



B.3 Profile of survey respondents' firms

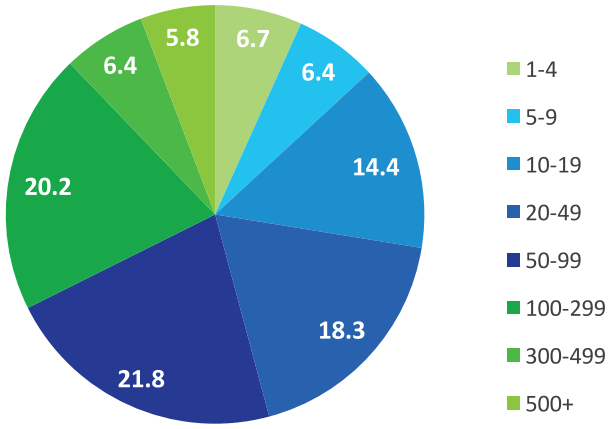
Focusing now on respondents' firms, just under half operate at one worksite in BC (Figure B6). Slightly more than 20% have multiple BC worksites, and an equivalent number operate at multiple locations inside and outside the province. One in ten has one worksite in BC and one or more outside the province

Figure B6: Where respondents' companies operate (%)



Using the WorkSafeBC classification for the size of participating firm's BC workforce, 27.5% are small firms (less than 20 employees), 40.1% are medium size (20-99 employees) and the rest (32.4%) are large (100 or more employees) (Figure B7).

Figure B7: Total number of full-time and part-time employees in BC (%)



Most firms (63%) do not have unions in their BC workforce, while 20% have some unionized sites in BC and another 17% have all unionized sites in BC (Figure B8).

Figure B8: Workforce unionization in respondents' firms

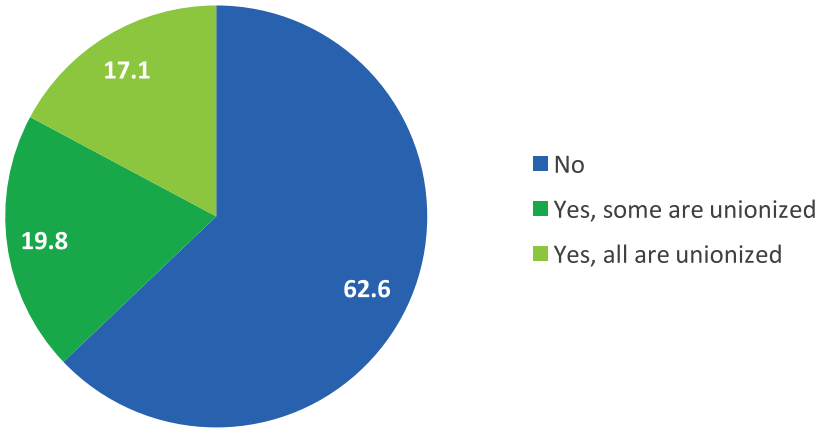
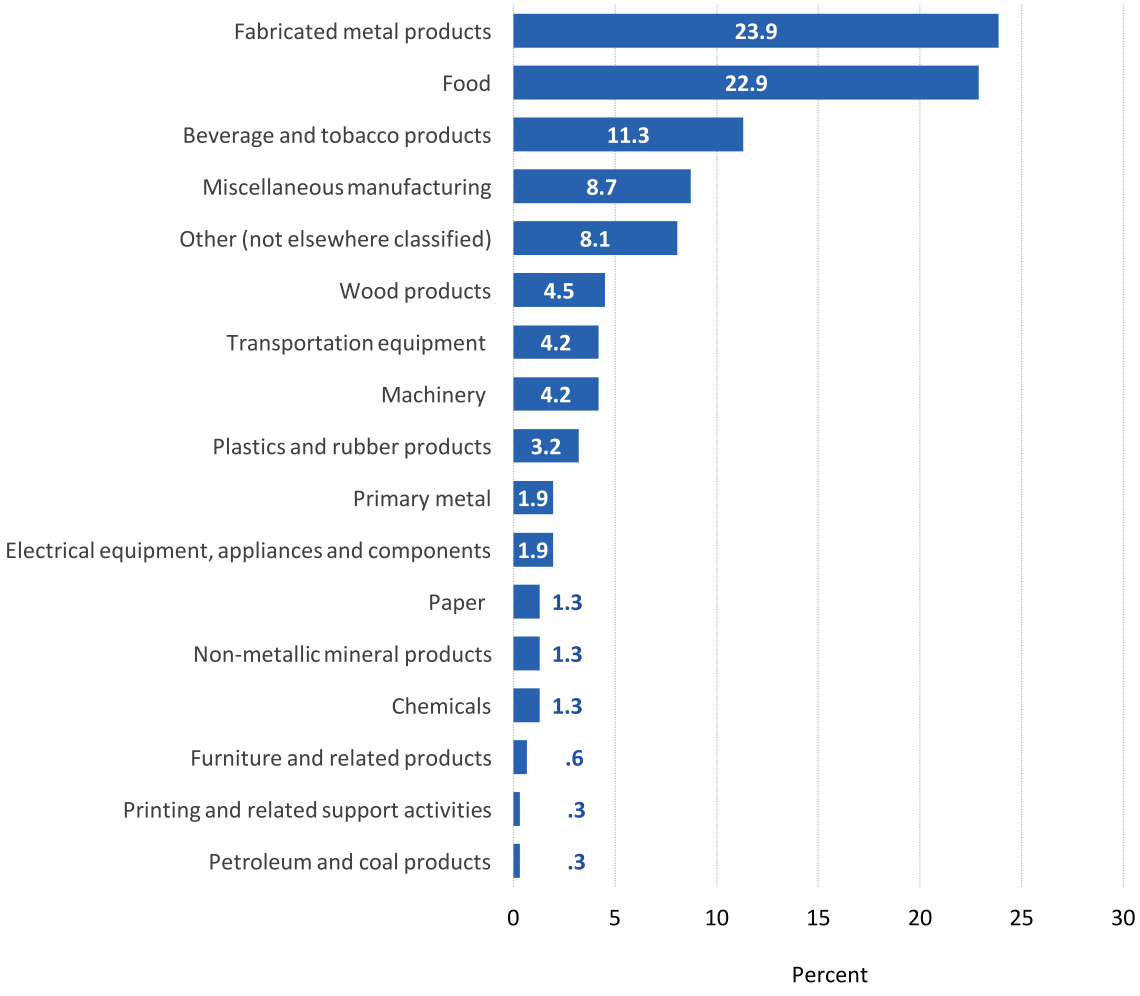


Figure B9 outlines the industry groups included in the survey, based on 3-digit NAICS. Consistent with their shares of the BC manufacturing sector overall, the largest two industry groups are fabricated metal products (24%) and food manufacturing (23%). Beverage (and tobacco) production accounts for 11% of the firm sample, while wood products, transportation equipment, and machinery each account for about 4% of all firms in the survey.

Figure B9: Survey respondents' industry group (NAICS)



B.4 Survey questionnaire

BC Manufacturing Employers' OHS Survey

INSTRUCTIONS

- The purpose of this survey is to document BC manufacturer's current and future labour market, training and education needs regarding Occupational Health and Safety.
- This survey will take about 15 minutes for you to complete.
- Participation in this survey is voluntary.
- Your responses are anonymous and all data collected is strictly confidential. Your employer's identity will not be disclosed.
- Data will be analyzed by an independent expert. Only group averages will be reported.
- Survey results will be reported on the Manufacturing Safety Alliance of BC's website.
- In this questionnaire, the abbreviation "OHS" refers to "occupational health and safety."
- If your company also operates outside of BC, please answer all questions with reference to your BC worksites only.

THANK YOU FOR YOUR COOPERATION

manufacturing
Safety Alliance of BC

YOUR JOB

1. **What is your current position or job title?**
   [select one only]

   a. CEO / President / Owner
   b. Senior Executive
   c. Human Resource Manager
   d. Safety Manager
   e. Other Manager
   f. Supervisor / Team Leader
   g. Safety (OHS) Advisor / Coordinator / Officer / Specialist
   h. Other (please briefly describe) _____

2. **Are you a Signatory of the BC Safety Charter?**

   [Yes / No / Don't Know]

3. **How many years have you worked in your current position?**

   [2 years or less/ 3-5 years / 6-10 years / 11-15 years / More than 15 years]

4. **In a typical work week, how much time do you spend on OHS matters?**

   [None / less than 25% / 25-49% / 50-74% / 75 – 100% / Don't know]

5. **Are you or your company a member of a safety association?**

   [Yes / No / Don't know]

   IF *NO* OR *DON'T KNOW* GO TO QUESTION 7
   IF YES:

6. **What is the name of the safety association?** (select all that apply)

   - BC Construction Safety Alliance
   - BC Forest Safety Council
   - Canadian Agricultural Safety Association
   - Farm and Ranch Safety and Health Association (FRSHA / AgSafe)
   - Manufacturing Safety Alliance of BC
   - Trucking Safety Council
   - Other (please briefly describe) _____

YOUR COMPANY

7. **Where does your company operate?** (select one only):
   - At one worksite in BC
   - At multiple worksites in BC
   - At one worksite in BC and one or more worksites outside of BC
   - At multiple locations inside and outside of BC

8. **What is the total number of employees (full-time and part-time) at all your BC locations?**

   [1-4 / 5-9 / 10-19 / 20 – 49 / 50 – 99 / 100 – 299 / 300 – 499 / 500 +]

   IF < 20 EMPLOYEES, GO TO QUESTION 11
   IF 20 OR MORE EMPLOYEES:

9. **Approximately what percentage of your employees in BC is in each of these demographic groups?**
   [0% / 1-24% / 25%-49% / 50% or more/ We don't collect this information / Don't know]
   a. 16 to 24 years of age
   b. 55 years of age or older
   c. Male
   d. Female
   e. Speak English as a second language
   f. Temporary foreign workers
   g. Seasonal workers

10. **Are any of your company's BC worksites unionized?**

    [Yes, all are unionized / Yes, some are unionized / No / Don't know]

11. **Which industry group best describes your company's business in BC?** (select one only)

Beverage and tobacco product manufacturing
Chemical manufacturing
Clothing manufacturing
Computer and electronic product manufacturing
Electrical equipment, appliance and component manufacturing
Fabricated metal product manufacturing
Food manufacturing
Furniture and related product manufacturing
Leather and allied product manufacturing
Machinery manufacturing
Non-metallic mineral product manufacturing
Paper manufacturing
Petroleum and coal product manufacturing
Plastics and rubber products manufacturing
Primary metal manufacturing
Printing and related support activities
Textile mills
Textile product mills
Transportation equipment manufacturing
Wood product manufacturing
Miscellaneous manufacturing
Other (please briefly describe) _____

OHS ROLES IN YOUR COMPANY

NOTE: If your company operates outside of BC, please answer all questions with reference to your BC worksites only.

12. **Does your company employ anyone in a full-time or part-time OHS position**

(including yourself, if you are in an OHS position)?

[Yes / No / Don't know]

IF NO OR DON'T KNOW GO TO QUESTION 16
IF YES:

13. **In total, how many people are employed in OHS positions?**

a. Total number in full-time OHS positions_____[Don't know]

b. Total number in part-time OHS positions _____[Don't know]

c. How many of these OHS workers have OHS professional qualifications, such as a post-secondary diploma/certificate/degree in OHS **or** a recognized safety certification such as Canadian Registered Safety Professional?
Total number of OHS workers with professional qualifications_____[Don't know]

14. **To whom does the most senior OHS worker in your company report?** (select one only)

- CEO / President / Owner
- Senior Manager or Vice President
- Human Resource Manager
- Operations Manager
- Other (please briefly describe) _____
- Don't know

15. **Do OHS personnel (including yourself, if applicable) provide support in the following areas?** (select all that apply)

- Return to work programs
- Analysis of organizational OHS metrics such as injury rates
- OHS policy development and implementation
- Psychological safety and health
- Safety culture and related programs
- OHS auditing and/or inspection
- Disaster/emergency preparedness including first aid
- Accident/incident investigation
- OHS Training for workers and/or managers
- OHS system/program development and implementation including hazard identification and control
- Joint health and safety committee support and coordination
- Don't know
- Other (please briefly describe) _____

16. **In the past 2 years (2015 and 2016), did your company recruit or attempt to recruit for an OHS position?**

[Yes / No / Don't know]

IF NO OR DON'T KNOW, GO TO QUESTION 21
IF YES:

17. **Please briefly describe the MINIMUM OHS qualifications you required for this position:**

_____

18. **In which regions did you attempt to recruit for an OHS position or positions?** (select all that apply)

- BC
- Other Canadian provinces
- Internationally
- Don't know

19. **Did you require applicants for the OHS position(s) to have work experience in manufacturing?**

[Yes / No / Don't know]

IF NO OR DON'T KNOW, GO TO QUESTION 21
IF YES:

20. **How many years of manufacturing work experience did you require?** (number of years) _____

21. **In the past 2 years, did your company experience difficulty recruiting for this/these OHS position(s)?**

[Yes / No / Don't know]

IF NO OR DON'T KNOW, GO TO QUESTION 23
IF YES:

22. **Briefly describe the MAIN recruitment difficulty your company experienced:**

_____

23. **In the past 2 years, did your company train one or more existing employees to fill OHS positions?**

[Yes /No / Don't know]

24. **In the past 2 years, has one or more OHS workers left your company?**

[Yes one / Yes more than one / No / Don't know]

IF NO OR DON'T KNOW GO TO QUESTION 27
IF YES:

25. **Do you know why that person [those persons] left your company?**

[Yes / No / Don't know]

IF NO OR DON'T KNOW GO TO QUESTION 27
IF YES:

26. **Was it for any of these reasons?** (select all that apply).

a. Dismissed
b. Left for another job opportunity
c. Returned to school for additional OHS education
d. Don't know
e. Other (please briefly describe) _____

27. **Does your company currently have any unfilled OHS positions?**

[Yes / No / Don't know]

28. **Does your company plan to recruit for one or more OHS professional positions within the next 5 years?**

[Yes / No / Don't know]

OHS CREDENTIALS

NOTE: If your company operates outside of BC, please answer all questions with reference to your BC worksites only.

IF QUESTION 12 = NO / DON'T KNOW GO TO QUESTION 33

29. **Please indicate if employees in OHS positions (including yourself, if applicable) have any of the following post-secondary OHS-related credentials** (select all that apply):

a. Diploma
b. Certificate
c. University degree
d. None
e. Don't know
f. Other (please briefly describe) _____

30. **Please indicate if employees in OHS positions (including yourself, if applicable) have any of the following OHS certifications** (select all that apply):

a. Canadian Certified Professional Ergonomist (CCPE)
b. Canadian Registered Safety Professional (CRSP)
c. Construction Safety Officer / National Construction Safety Officer (CSO / NCSO)
d. Certified Health and Safety Consultant (CHSC)
e. Registered Occupational Hygienist / Certified Industrial Hygienist (ROH / CIH)
f. None
g. Don't know
h. Other (please briefly describe): _____

31. **Are any employees in an OHS role (including you, if applicable) currently studying for an OHS certification, diploma, degree or other OHS credential?**

[Yes / No / We don't collect this information / Don't know]

IF NO / DON'T COLLECT THIS INFORMATION/ DON'T KNOW GO TO QUESTION 33
IF YES:

32. **Please describe all the credential(s) that is (are) being studied for:** _____

_____

33. **If your company was recruiting for an OHS position today, what would be the MOST IMPORTANT qualification you would look for?** _____

YOUR COMPANY'S SAFETY PRACTICES

NOTE: If your company operates outside of BC, please answer all questions with reference to your BC worksites only.

34. **Does your company use an OHS management system?**

[Yes / No / Don't know]

IF 20 OR MORE EMPLOYEES GO TO QUESTION 37
IF QUESTION 8 = < 20 EMPLOYEES:

35. **Does your workplace have a worker health and safety representative?**

[Yes/No / Don't know]

IF NO OR DON'T KNOW GO TO Question 39
IF YES:

36. **How strongly do you agree or disagree with this statement?**

Having a worker health and safety representative helps to achieve the company's OHS goals.

[Strongly disagree / Disagree / Neither disagree nor agree/ Agree / Strongly Agree / Don't know]

37. Does your workplace have a joint health and safety committee?

[Yes / No / Don't know]

IF NO OR DON'T KNOW GO TO Question 39
IF YES:

38. **How strongly do you agree or disagree with this statement?**

Having a joint health and safety committee helps to achieve the company's OHS goals.

[Strongly disagree / Disagree / Neither disagree nor agree/ Agree / Strongly Agree / Don't know]

39. **Please indicate if your organization has received any of the following:**

[Yes / Uncertain / No]

a. CSA – Z1000
b. OHSAS 18001
c. ISO 14000
d. Occupational Safety Standard of Excellence Certification (OSSE)
e. WorkSafeBC Certificate of Recognition (COR)
f. Other OHS certification or award (please briefly describe)_____

40. **Based on the number and severity of lost-time injuries over the past 3 years (2014, 2015 & 2016), has your company's safety performance at its BC locations improved, stayed the same or worsened?**

[Improved / Stayed the same / Worsened / Don't know]

41. **Overall, how satisfied or dissatisfied are you with your company's overall OHS performance?**

[Very dissatisfied / Dissatisfied / Neither dissatisfied nor satisfied / Satisfied / Very satisfied / Don't know]

IF VERY SATISFIED, SATISFIED OR NEITHER GO TO Question 43.
IF VERY DISSATISFIED OR DISSATISFIED:

42. **What would help your company to improve its OHS performance?**

[select all that apply]

- More OHS training for supervisors/managers
- More OHS training for workers
- Hiring one or more qualified OHS workers
- More time to focus on OHS
- More money for OHS
- Don't know
- Other resources (please briefly describe) _____

OHS TRAINING IN YOUR COMPANY

NOTE: If your company operates outside of BC, please answer all questions with reference to your BC worksites only.

43. **In 2016, did your company provide any OHS training to employees?**

[Yes / No / Don't know]

IF NO OR DON'T KNOW GO TO Question 47
IF YES:

44. **Which groups of employees received this OHS training? (select all that apply)**

a. All employees
b. Front-line workers
c. New hires
d. Managers / Supervisors
e. Members of a joint health and safety committee
f. Employee safety rep
g. None of the above
h. Don't know
i. Other _____
(please briefly describe)

IF NONE OF THE ABOVE GO TO Question 47
IF ANY OF THE ABOVE:

45. **Did you evaluate the effectiveness of the OHS training your company provided in 2016?**

[Yes / No / Don't know]

IF NO OR DON'T KNOW GO TO Question 47
IF YES:

46. **Based on this evaluation, has the company made improvements or does it plan to make improvements in its OHS training?**

[Yes / No / Don't know]

47. **During 2016 did your company provide any employees with financial support for the following:**

a. Courses leading to an OHS degree/diploma/certificate?
[Yes / Uncertain / No]

b. Professional development courses required to maintain an OHS certification?
[Yes / Uncertain / No]

48. **Do you have any employees who could benefit from receiving OHS training in a language other than English?**

[Yes / No / Don't know]

YOUR COMPANY'S FUTURE OHS NEEDS

NOTE: If your company operates outside of BC, please answer all questions with reference to your BC worksites only.

49. **Over the next 5 years, how important for achieving your company's OHS goals will it be for your employees to acquire additional skills and knowledge?**

[Not important / Somewhat important / Important / Very important / Don't know]

50. **Do you expect the following types of change to create OHS risks for your company in the next 5 years?**

[Yes / Uncertain / No]

a. New production technologies
b. New products
c. New quality standards
d. New work processes
e. Company growth

51. **If you expect any other types of change to create OHS risks for your company in the next 5 years, please briefly describe:** _____

52. **What do you see as the GREATEST health and safety challenge your company will face in the next 5 years?** (please briefly describe) _____

53. **What is the MOST IMPORTANT OHS resource your company will need to meet that challenge?**

(please briefly describe) _____

BACKGROUND INFORMATION

Please provide the following information about yourself so we can compare different groups of survey respondents.

54. **Gender**

[Female / Male / Prefer not to answer]

55. **Age**

[16-24 / 25-39 / 40-54/ 55+ / Prefer not to answer]

56. **Within the next 5 years, how likely is it that you will:**

[Very unlikely / Somewhat unlikely / Likely / Very likely]

a. Retire?
b. Look for a job with another manufacturer?
c. Look for a job within another industry?
d. Change occupations?
e. Return to school to acquire further OHS qualifications?
f. Leave this company to become an independent OHS consultant?

57. **In which region(s) of BC do you work?** (select all that apply)

[Lower mainland / Vancouver Island & Coast / Thomson Okanagan / Cariboo / North Coast / Nechako / Northeast]

THANK YOU FOR COMPLETING THIS SURVEY

Appendix C: Focus Group Methodology

C.1. Methodology overview

Five regional focus groups were conducted (Kelowna, Nanaimo, Prince George, Langley and Burnaby) with representative employers (by size and subsector) to further explore the use of OHS professionals and the barriers and enablers firms face to recruiting, training and retaining appropriately skilled OHS personnel. Most groups ran for two hours, one (which had three persons) lasting just over 90 minutes.

Here is a summary of the 26 individuals participating in the focus groups and their firms:

- 13 were large firms (100+ employees); 13 were medium sized (20-99 employees)
- 18 firms produced durable goods; 18 non-durable
- 17 participants were in OHS roles; 9 help senior operations manager roles
- 7 participants were female, 19 male
- 9 of the firms are OSSE certified (evidence of an effective OHS management system in place)

The researcher facilitated the focus groups following a set question format (see focus group questions on the following page). With participants' permission, discussions were recorded and later transcribed. Content analysis of the transcriptions identified key themes and issues, which are summarized in this report.

Focus groups addressed the following topics:

- OHS roles in the company;
- Recruitment and retention of OHS personnel;
- Company's approach to OHS; OHS training and education;
- OHS 'best practices' and benchmarking; and
- Future OHS needs and challenges.

C.2. Focus group questions

INTRODUCTIONS

1. **Please tell us your name, your company's name and line of business, and your OHS role in the company.**
   - What type of OHS educational credential or professional certification do you have?
   - What type of experience do you have in OHS?

OHS ROLES

2. **Do you employ OHS professionals and if so, how do they contribute to achieving safety improvements? In the medium-term future (the next two to five years), do you think the role of OHS professionals needs to change in manufacturing in order to improve safety performance? How should the role change?**
   - What about the longer term, over the next ten years?
   - Does a company's size, geographic location, subsector or workforce demographics influence their use of OHS professionals? How and why?
3. **Do other staff, who are not OHS professionals, contribute to achieving safety improvements in your company?**
   - What are their roles and how are they contributing?

RECRUITMENT AND RETENTION

4. **Has your company been able to recruit OHS personnel that meet your company's needs?**
   - What challenges or barriers have you faced in this recruitment?
   - Looking in to the future (two to five years, up to ten years), do you expect it to become easier or more difficult to recruit OHS professionals? How and why?
   - Does a company's size, location, subsector or workforce demographics influence this? How and why?
   - What sorts of organizations are your main competition in the OHS labour market? (e.g., other mfg. firms, local employers in other industries, government or WorkSafeBC, employers in other regions or provinces)
5. **Has your company had success internally training employees to fill OHS positions?**
   - Is this a more effective alternative for you than trying to externally recruit OHS professionals?

6. **What's the demographic profile of workers interested in pursuing this career path? (younger, mid-career, front-line workers, HR background, etc.?)**
   - Have you experienced turnover of OHS professionals in the past few years?
   - What are the main factors contributing to this turnover?
   - How have you tried to address this?
7. **What sorts of credentials, skills and experience do you consider essential for an OHS professional today?**
   - Do you expect this to change in the future (two to five years; up to ten years)? How and why?
   - Does a company's size, location, subsector or workforce demographics influence the OHS competencies required? How and why?

COMPANY APPROACH TO OHS

8. **How aware/committed are your employees and senior managers to creating and maintaining a safe workplace?**
   - How would you describe your company's safety culture?
9. **What challenges or barriers get in the way of your company's ability to improve OHS in the workplace?**
   - What do you think is the best way to support senior management to improve workplace safety?

OHS TRAINING AND EDUCATION

10. **Based on your experience, do current post-secondary OHS programs meet the needs of the manufacturing sector?**
    - What skills and competencies are they good at providing? What are the gaps in this regard?
    - Which institutions offer OHS training and education that address the needs of the manufacturing industry?
    - Which specific post-secondary programs are most effective at meeting the OHS needs of the manufacturing sector?
11. **What can educational institutions or universities do differently to train future OHS professionals for manufacturing?**
    - Would an OHS training or certification program designed specifically for manufacturing be helpful in future?

BEST PRACTICES

12. **Which industries or companies do you look to for 'best practices' in terms of OHS education, training and development?**
    - What role do OHS professionals play in these benchmark firms?
    - More generally, what can BC manufacturers learn from these benchmark firms?

FUTURE NEEDS

13. **In your view, what business changes in manufacturing will create the biggest OHS risks over the next 5 – 10 years?**
    - What about changes in work processes and new technologies?
    - Are you concerned that the growth of your business will present OHS challenges?
    - What OHS personnel, skills and training will manufacturers need to successfully address these risks?
    - How will you obtain these resources? What sorts of organizations could be helpful in this regard?
14. **Do you have any suggestions for helping smaller manufacturing firms acquire and use OHS expertise, either from OHS professionals, OHS training, or both?**

Appendix D: Key Informant Interviews

D.1 Overview of key informant interviews

To fill data collection gaps, the researcher conducted phone interviews with 13 key informants. These included BC post-secondary institutions offering OHS training (4 interviews), manufacturing firms in BC that have received awards for their outstanding safety practices (2 interviews), small firms to better understand their OHS challenges (two interviews), and representatives of industry associations with a mandate to improve workplace safety (five interviews).

D.2 Key informant interview questions

INDUSTRY ASSOCIATIONS

1. **Please describe your association's role in helping your members improve their OHS performance.**
   - Please describe the specific OHS professional development and training services or resources you provide to members.
   - What are the characteristics of firms that use these services?
   - Do you evaluate these services, and if so, what changes have you made based on these evaluations?
2. **I'm interested in your perspective on how your members go about recruiting, developing and retaining OHS professionals.**
   - What sorts of OHS professional credentials (post-secondary) and certifications (e.g., CRSP) are sought after by your members?
   - What are the biggest challenges or barriers they face in recruiting, regaining and developing OHS professionals?
   - What's the ideal skill set for an OHS professional, based on what your members are looking for and want to develop?
   - Do your members prefer to recruit OHS professionals externally, or train employees to fill these roles internally?
3. **What additional training or experience is required to ensure that an OHS professional is able to fully contribute within a manufacturing (OR your industry) setting?**
4. **Looking at your members with outstanding safety records, what do you (your association) consider to be OHS 'best practices'?**

5. **Based on your association's experience offering OHS training, what works best in terms of delivery, program design, and target employee groups?**

6. **What does your association see as the biggest OHS risks that will face your members in the next five to ten years?**

   - How are members addressing these risks?
   - How is the association assisting members to address these risks?

7. **Based on your association's experience, do you have suggestions for how smaller firms can be assisted to acquire and use OHS expertise, either from OHS professionals, OHS training or both?**

POST-SECONDARY INSTITUTIONS

1. **What are your program plans for the next five years?**

   - On what evidence of market demand are you expansion plans based?
   - In which industries or types of employers do you see the greatest future demand for your grads?
   - What is your program review cycle, and when will be the next opportunity to change or expand the program?

2. **How do you go about meeting industry-specific OHS training and development needs?**

   Are there examples of how you have accommodated industry-specific needs into your program or course offerings?

3. **Do you have any information at all on the career trajectories of your grads that are, or have been, employed in manufacturing?**

   - What sorts of additional certifications, education and training have been built onto their credential for the program to succeed in a manufacturing setting?

4. **Based on your experience, do you have suggestions for how smaller firms can be assisted to acquire and use OHS expertise, either from OHS professionals, OHS training or both?**

5. **What's the demographic composition of students in your program, and has this been changing?**

   - Is OHS a field that seems to be attracting young people?

MANUFACTURING COMPANIES

1. **Your company has been recognized for its outstanding OHS performance.**

   What are the key factors contributing to your safety record?

2. **How have your OHS professionals contributed to your safety goals?**

   - What combination of education, training and experience makes them effective?
   - Is any particular certification of education program most relevant in this regard?
   - Can you describe any difficulties you have had recruiting qualified OHS professionals, and how have you overcome these challenges?

3. **Looking into the future (five to ten years), do you see any changes needed in the roles of your OHS professionals?**

   - Please describe these changes.
   - What sorts of additional education and/or training will OHS professionals require to remain effective in their roles?

4. **How do you sustain an effective OHS management system?**

   - (If not already described…) What role do your OHS professionals play in sustaining your OHS management system?
   - What are the main lessons you can share with other manufacturers?

5. **How did your company develop its strong safety culture?**

   - (If not already described…) What role did OHS professionals play in developing and sustaining your safety culture?
   - What are the main lessons you can share with other manufacturers?

6. **What does your company see as the biggest OHS risks that it will face in the next five to ten years?**

   - How do you plan to address these risks?
   - What role will your OHS professionals play in this regard?
   - What sorts of new or additional OHS training will be required, and which employee groups will need to receive this?

7. **Based on your experience, do you have suggestions for how smaller firms can be assisted to acquire and use OHS expertise, either from OHS professionals, OHS training or both?**

Appendix E:
Description of OHS certifications in Canada

E.1 Canadian Certified Professional Ergonomist (CCPE)

Canadian law does not restrict the use of the term 'ergonomist', so anyone can use this title. The Canadian College for the Certification of Canadian Ergonomists (CCCPE) offers a voluntary professional certification program, with the designation CCPE (Certified Canadian Professional Ergonomist).[75] CCPE is the only ergonomics/human factors certification in Canada. In 2015, there were 237 CCPEs nationally, with membership numbers increasing. The CCCPE was unable to provide the number of members currently working in BC.

E.2 Canadian Registered Safety Professional (CRSP)

The CRSP certification is the mostly widely accepted OHS certification in Canada, often required by employers when recruiting for safety positions. CRSP-holders are health and safety generalists. Based on information provided to the researcher by the BCRSP, there were 607 practicing CRSP-certified OHS professionals in BC as of January 2017. This represents a 10% annual increase since 2012. Nationally, there were 4,623 CRSPs as of the end of 2015 and 537 applicants waiting to write CRSP exams.[76]

As noted, eligibility criteria to apply for CRSP certification are increasing on July 1, 2018.[77] The main impetus for changes is to keep up with OHS professions in the US, UK, Europe and Australia, where higher standards for education and experience already exist. The BCRSP was involved in the development of the INSHPO's OHS Professional Capability Framework, discussed earlier.

The impact of these increased requirements is expected to result in greater employment opportunities for safety professionals in future, increasing their professional recognition and influence. No projections are available on the impact these increased requirements will have on the number of CRSP applicants.

75 cccpe.ca
76 Board of Canadian Registered Safety Professionals, *Annual Report 2015*, p. 18.
77 bcrsp.ca/prospective-certificants/notification-upcoming-changes

The only information available on CRSP's employment by industry comes from a 2015 Salary Survey Report. Since 2013, there has been a decrease in CRSPs reporting employment in mining and petroleum, and an increase in manufacturing, construction and healthcare. In Western Canada in 2015, 5.7% of survey respondents (a total of 52 individuals) worked in manufacturing.[78]

E.3 Certified Health and Safety Consultant (CHSC)

The CHSC certification is administered by the Canadian Society of Safety Engineering. In 2016, there were 4,205 CHSCs in Canada and 659 in BC.[79] CHSCs perform external or internal consulting roles on safety matters to businesses, industries and government agencies. Applicants to the CHSC program must have at least five years of OHS experience in an advisory or consulting role with a minimum of 51% OHS duties, plus a one-year post-secondary certificate or diploma program in OHS or a 2-year college or university non-OHS program.

E.4 Certified Health and Safety Management System Auditor (CHSMSA)

The Auditing Association of Canada's (AAC) Certified Health and Safety Management System Auditor (CHSMSA) designation provides a Canadian benchmark for health and safety management systems auditing. The criteria were developed from the same requirements as other leading auditor programs and are based on ISO 19011. There are only three CHSMSAs working in BC.

E.5 Occupational Health Nurses (OHN)

According to the Occupational Nurses' Specialty Association of British Columbia, in 2016 two new OHS nursing certifications were granted in BC by the Canadian Nurses Association, bringing the provincial total to 20.[80]

This compares with 322 OHNs working in Alberta, mostly employed by large energy and construction companies. OHNs are registered nurses who have accumulated approximately 3,000 to 4,000 hours of experience in occupational health nursing and/or completed a post-RN training course in OHN.

78 Board of Canadian Registered Safety Professionals. (October 2015). *Report on the 2015 Salary Survey.*

79 CSSE 2016 Annual Report: d3n8a8pro7vhmx.cloudfront.net/csse/pages/137/attachments/original/1478271564/CSSE-2016-Annual-Report.pdf?1478271564

80 Data provided to the researcher by the Occupational Nurses' Association of BC.

E.6 Registered Occupational Hygienists and Technologists (ROH/ROHT)

Registered Occupational Hygienists (ROH) are a relatively small OHS profession. ROHs address workplace health risks and hazards, such as chemical, physical or biological agents that can cause cancer. ROHs must have a bachelor's degree in science or engineering, five years occupational health experience, and then successfully write the ROH exam.

According to the Canadian Registration Board of Occupational Hygienists (CRBOH), there were a total of 283 practicing ROHs in 2015 nationally, down from 291 in 2011. The number of ROH's in BC in 2016 is 27, with little change since 2011.[81] According to the CRBOH's 2010 salary survey, very few respondents were employed in manufacturing.[82] Most worked in consulting, government regulatory agencies and government non-regulatory agencies.

There also is a Registered Occupational Hygiene Technologist, which requires less education and experience (high school plus 5 years OHS experience) plus an exam. In 2015-2016, there were seven ROHTs working in BC and 68 nationally.

E.7 National Construction Safety Officer

The National Construction Safety Officer (NCSO, formerly called Construction Safety Officer or CSO) designation is relevant to manufacturing. Currently there are approximately 520 CSOs working in BC, with few working in the manufacturing sector.[83] The number of CSOs in BC has increased in recent years. Increased applications for the NCSO program are expected as it becomes more entrenched in BC. The NCSO requires more courses than the CSO did, at least three years of construction field experience, a safety proficiency assignment and a provincial and national exam. Several focus group participants had the CSO designation.

81 Data provided to the researcher by the CRBOH.
82 crboh.ca/documents/324salary%20survey%20report%202010.pdf
83 Email exchange with Michael McKenna, Executive Director, BC Construction Safety Association. January 4, 2017.

manufacturing
Safety Alliance of BC

T 1.604.795.9595 **F** 1.604.795.9507 **E** manufacturing@safetyalliancebc.ca
Unit A, 43833 Progress Way | Chilliwack, BC V2R 0E6 | **safetyalliancebc.ca**

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