National Occupational Standards

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FOOD PROCESSING HR COUNCIL
CONSEIL DES RH DU SECTEUR DE LA TRANSFORMATION DES ALIMENTS

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Executive Summary

Technological changes create the need for skills upgrading for less skilled employees to manage and understand new processing systems and operate new equipment and machinery.

Manufacturing industries have long been defined by their two principal assets—the machines and more importantly the people who operate them. In the food and beverage manufacturing industry such a description is applicable. In recent years, rapid changes in technology, a declining and aging workforce, increased regulation, and a growing immigrant labour pool without all the requisite skills and qualifications, are some of the leading challenges of the industry.

As a result of the rapid changes in the food and beverage processing industry, the Food Processing Human Resource Council (FPHRC) commissioned a research study which looked at industry needs and existing national occupational standards (NOS) methodologies in order to help employers address skills and training shortages in their industry more effectively. This study confirms that employers are adopting new technologies in order to stay competitive. The adoption of technology in the food and beverage industry will continue to impact the skill requirements of the existing and future workforce. Technological changes create the need for skills upgrading for less skilled employees to manage and understand new processing systems and operate new equipment and machinery. In addition, increased government regulations, food safety, and health and safety requirements have increased the burden on businesses to provide food processing training where little training is currently available.

Furthermore, a priority for the future includes the requirement for higher level skills. When businesses expand and there is an increasing need for managers and supervisors, employers need to have employees with basic or essential skills in order to be able to grow their workforce. As a result, the industry needs a streamlined approach to identifying skill requirements and developing training and certification. This will ensure these needs are met, sustaining the productivity and competitiveness of the sector.

Overall, occupations have become more complex and require greater competency across broader key functional areas, in addition to job specific skills. This is especially true for manufacturing industries where integration of job roles within and across functional areas is critical for productivity and efficiency. These factors have resulted in a trend towards the adoption of broader competency-based approaches to occupational analysis and standards during the past 10-15 years. Attention has shifted from analyzing discrete job tasks to analysis of broader functional area competencies.

The development of a competency-based NOS framework that encompasses broader industry subsectors and functional areas is seen as a critical next step for many countries and the industries within them as they look to develop standards that reflect current workplace structures. For skill standards and profiles to be useful, they must reflect this change in the industry by covering all aspects of the industry in an integrated manner. As a large and multi-sector industry, the competency-based NOS methodology is particularly suited to the food and beverage processing industry.

Consequently, this report recommends an integrated approach to the development of skill standards that mirrors the functionality and organization of the food and beverage industry. As such, it is recommended that FPHRC develop of a competency-based NOS framework that encompasses broader industry subsectors and functional areas.

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1.0 Introduction

Food Processing Subsectors:

- Animal Food Manufacturing
- Grain and Oilseed Milling
- Sugar and Confectionary Product Manufacturing
- Fruit and Vegetable Preserving and Specialty food Manufacturing
- Dairy Product Manufacturing
- Meat Product Manufacturing
- Seafood Product Preparation and Packaging
- Bakeries and Tortilla Manufacturing
- Beverage Manufacturing
- Other Food Manufacturing

The past two decades have been characterized by rapid changes in technology, increasing global competitiveness and the restructuring of business practices within the food and beverage processing industry. Trends[1] show that Canadian food and beverage processors are facing a complex and competitive business environment. Growth in the Canadian food and beverage industry is dependent on the industry's ability to embrace technology and to employ a dedicated and skilled workforce.

Canada's food and beverage processing industry faces a number of challenges: increasing technological demands, a declining and aging workforce, increased regulation, and a growing immigrant labour pool without all the requisite skills and qualifications. In order to be reactive to these challenges the food and beverage processing industry needs to upgrade and retrain the current workforce while ensuring that bright and motivated people are attracted to the industry. All workers – current, new and potential – need to have opportunities to acquire the skills required to succeed in the future. The industry needs a streamlined approach to identifying skills and developing training and certification to ensure the productivity and sustainability of the sector.

[1] Food Processing Labour Market Information (LMI) Report, 2011
Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008
Overview of the Food Processing Industry Report, 2005

A primary research, which included a sector scan and key informant interviews, has indicated that there is a requirement for a national approach to identifying common core and occupational specific skills and training requirements for workers sector wide.

Specifically, the Diagnostic Assessment and Definition of the Food Industry in Canada report (2008) indicated that 'there was a need for a consolidated, national means to access training programs and to certify and/or recognize skills that are common across food processing subsectors such as Hazard Analysis Critical Control Points (HAACP), health and safety, and technology training and regulation.' The sector scan also indicated a lack of consistency of training throughout the country, and across the food processing subsectors.

The Diagnostic Assessment also identified several key areas across the food and beverage industry that need to be addressed to help the industry remain competitive. In particular, identified needs included:

- Certification and/or recognition of training programs and skills that are common across subsectors;
- Greater skills development across subsectors;
- Enhancement of the relationship between the food and beverage processing industry and educational bodies; and
- Provision of a forum for employers to share skills needs (particularly for industry experts).

Canada's food and beverage processing industry faces a number of challenges: increasing technological demands, a declining and aging workforce, increased regulation, and a growing immigrant labour pool without all the requisite skills and qualifications.

1.1 Purpose of the NOS Research Project

In order to verify these key areas, identify and prioritize occupations and skills in demand and determine a suitable NOS methodology for moving forward, the Food Processing HR Council (FPHRC) conducted a needs assessment of the industry. Given the industry needs identified in recent research reports[2], FPHRC commissioned Human Resources Systems Group Inc. (HRSG) to:

- Conduct a needs assessment identifying occupations in demand for the purpose of developing national organizational standards (NOS),
- Identify skills that are common across subsectors of the industry,
- Propose a standards development methodology which will serve to support certification and/or recognition of training programs

[2] Food Processing Labour Market Information (LMI) Report, 2011
Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008
Overview of the Food Processing Industry Report, 2005

1.2 Methodology

In order to identify occupations in demand and research current NOS/Profile frameworks and methodologies, HRSG:

- Conducted primary and secondary research to identify:
  - Sector trends
  - Occupations in demand
  - Skills shortages

- Reviewed existing national and international NOS frameworks for:
  - Methodology and framework trends
  - Development methodologies used
  - Applicability to the food and beverage processing industry

The last section of this report makes recommendations regarding an NOS approach and framework for the Food Processing HR Council

This report is organized into three main sections. The first part comprises a sector scan and primary research of sector and labour trends and the impact of these trends on standards development. The second part of this report is comprised of a literature review of trends in NOS methodologies to determine which methodologies and approaches could be adapted for the food and beverage processing industry. The last section of this report makes recommendations regarding an NOS approach and framework for the Food Processing HR Council (FPHRC).

2.0 Food and Beverage Processing Sector Overview

This section highlights the findings from a sector scan and needs assessment research on overall sector trends, labour trends and skills in demand for the food and beverage manufacturing industry. The second part of the section discusses what these trends suggest for skills standards development.

The FPHRC defines the food processing sector as those establishments under NAICS Code 311 Food Manufacturing) as well as beverage manufacturing (NAICS 3121). Establishments in this sector total approximately 6,500 (Statistics Canada) employing approximately 250,000 workers (Statistics Canada). The majority (90%) of food processors in Canada are staffed by less than 100 employees.

The food and beverage processing industry accounts for 17% of total manufacturing shipments, worth a total of $89 billion making it the largest manufacturing industry in Canada and contributing 2% of the national GDP (Agrifood Canada Agriculture and Agri-Food Canada). The majority of food processing establishments are concentrated in Ontario, Quebec and British Columbia.

The majority of food processing establishments are concentrated in Ontario, Quebec and British Columbia.

2.1 Sector Trends

2.1.1 Pressure to Automate and Adopt Technology

Canadian food imports have increased much faster than exports and as a result net trade has declined. Additionally, distribution of products generally now occurs through national retail chains that utilize centralized distribution and access products from a wide range of countries that can produce products at lower costs due to variations in regulations and lower labour costs. As a result, the Canadian food processors are struggling to stay competitive.

As global competition increases, it is critical for food and beverage processing businesses to adopt new technologies and automation in both food processing and inventory control/ management to improve productivity and control costs. The skill requirements and associated training of employees will be impacted as these new technologies are adopted. Additionally, higher energy costs are causing concern among manufacturers who are increasingly looking for ways to conserve energy and reduce costs. Many are increasing their recycling efforts and redesigning packaging to lessen the impact on the environment. These changes also reflect the need to adopt new technologies and processes.[3]

As global competition increases, it is critical for food and beverage processing businesses to adopt new technologies and automation in both food processing and inventory control/management to improve productivity and control costs.

Research shows that there continues to be extensive differences in the adoption of technology across food processing subsectors and companies within Canada. Dairy and fruit/ vegetable processing have the highest adoption rate of new technologies while bakeries have the lowest rates. While many larger businesses have embraced new technologies to improve efficiencies and productivity, financially the adoption of new technologies presents a big challenge for many small to medium enterprises (SMEs).

One outcome of different levels of technology uptake is that the key skills required at the occupation level will vary. Consequently, occupation-based NOS for the sector would be difficult to capture. This is an important consideration when selecting an approach or framework to standards development.

2.1.2 Food Safety, Food Labeling and Health and Safety Regulations

Food safety requirements have become stricter and enforcement has become more rigorous in recent years. As a result, food safety programs such as HACCP have become more important. Additionally, all products in Canada are guided by food labeling regulations. Similar to food safety regulations, labeling requirements have become more stringent and complex.

[3] U.S. Department of Commerce Industry Report: Food Manufacturing NAICS 311, 2008
Industry Canada, Food Manufacturing NAICS 311, http://www.ic.gc.ca/cis-sic/cis-sic.nsf/IDE/cis-sic311defe.html

Closely aligned with food safety and food labeling is health and safety. Food and beverage processors need to know how to meet these requirements and include additional processes to address concerns about ensuring food safety[4]. Food processing businesses will need a strong understanding of regulatory requirements and trained staff to oversee and their implementation.

2.1.3 Impact of Sector Trends on the Food Processing Industry

The adoption of new technologies, food safety and health and safety systems would allow the Canadian food processing industry to continue to maintain its competitiveness, and more importantly, consumer confidence. Although each subsector within food processing has unique needs, the industry trends present similar challenges for all.

Technological and regulatory changes create skills upgrading needs for employees. Employees must learn to manage and understand new processing systems and operate new equipment and machinery. This needs to be accomplished while meeting food safety and other requirements. These issues are already impacting the industry through shortages of skilled labour and will continue to do so for the foreseeable future.

Advances in technology have reflected in a decreased number of production employees; however the demand for more skilled production employees has increased.

2.2 Labour Trends

2.2.1 Production Jobs Decreasing, Administrative Jobs Increasing

Over the past decade, the number of employees in the food and beverage manufacturing industry has decreased by 4%.[5] This decline was partially the result of automation and technology adoption, which has required fewer labourers (semi-skilled workers[6]), but more skilled employees. In addition, employment numbers from Statistics Canada indicate that the number of Production employees has dropped while the number of Administrative employees has risen. Although the salary of production employees has steadily increased it has not increased as fast as the Administrative employees. Advances in technology have reflected in a decreased number of production employees; however the demand for more skilled production employees has increased.

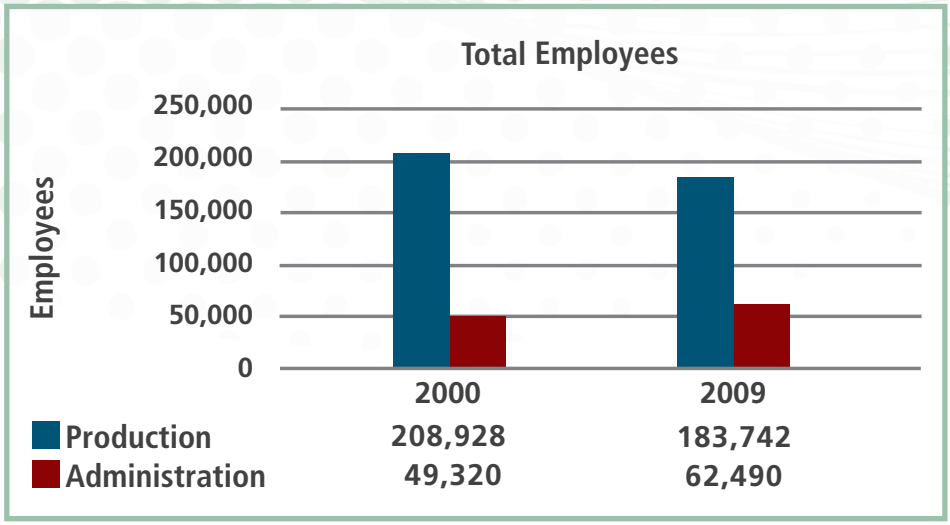
The figure below illustrates the labour trends between Administrative and Production employees from 2000 to 2009.[7]

[4] Food Processing Labour Market Information (LMI) Report, 2011

[5] Food Processing Labour Market Information (LMI) Report, 2011

[6] Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008

[7] Industry Canada, Food Manufacturing NAICS 311, http://www.ic.gc.ca/cis-sic/cis-sic.nsf/IDE/cis-sic311defe.html



...as technology is adopted, there will be a growing need for technologically proficient employees while the need for semi-skilled workers will decrease.

Figure 1: Production versus Administrative Job Trends

2.2.2 Labour Shortages

Even with the decline in production jobs, the demand for skilled workers will continue to be higher than the supply due to attrition of older workers, out migration in some provinces, a lack of awareness among youth and other job seekers about careers in the sector and competition from other manufacturing industries. For example, a significant number of skilled workers are drawn to the oil, gas and construction industries in NFLD and Alberta, due to the higher wages offered. While labourers (semi-skilled workers) currently make up over 40% of the total industry workforce, research indicates that as technology is adopted, there will be a growing need for technologically proficient employees while the need for semi-skilled workers will decrease[8].

Occupational trends identified skilled, technology proficient employees as the most challenging to hire. Those identified included[9]:

- Precision workers
- Machine operators
- Maintenance positions
- Technicians/technologists (e.g., quality control)
- Supervisors
- Administration staff

[8] Food Processing Labour Market Information (LMI) Report, 2011
U.S. Department of Commerce Industry Report: Food Manufacturing NAICS 311, 2008
United Kingdom Sector Skills Assessment for the Food and Drink Manufacturing and Processing Industry: Summary Report, 2010

[9] Food Processing Labour Market Information (LMI) Report, 2011
Key Informant Interviews (September-October, 2011)

Additionally, maintenance positions will become more critical in the future. These positions include:

- Mechanics
- General Technicians
- Equipment Maintenance Technicians

The labour shortage is not only an issue with skilled labour but also with higher-level positions requiring post secondary education, such as administrative and management positions and specialists such as Engineers and Food Scientists[10].

Primary Research

A sector survey was conducted which served to verify the results from the sector scan and preliminary interviews. The survey consisted of respondents from all the subsectors across the provinces. The total number of respondents was 278. For a demographic breakdown of survey responders, please see Appendix 1.

...the demand for skilled workers will continue to be higher than the supply due to attrition of older worker...

The respondents identified the following as the top five occupations in greatest demand:

1 Production Workers
2 Skilled Workers
3 Quality Control Technicians
4 Supervisors
5 Maintenance Workers/Sanitation Workers

The figure below illustrates the percentage of respondents who selected the occupation as high priority (i.e., needed to satisfy important functional needs).

[10] National Seafood Sector Council, Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008

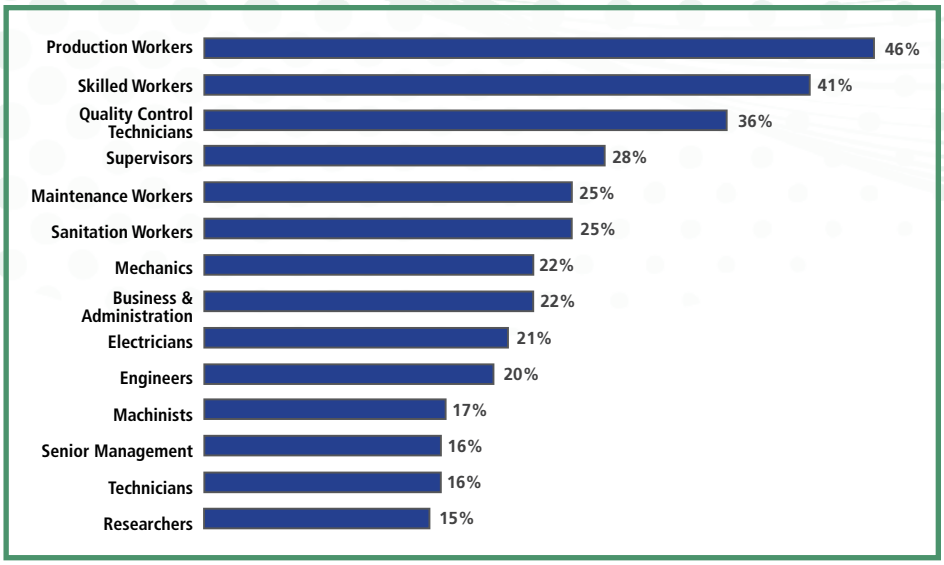


Figure 2: Graph identifying high demand occupations.

Production Workers, Skilled Workers and Quality Control Technicians continue to be high priority across the subsectors...

Additionally, data was collected to identify the number of respondents from each subsector. The graph below shows a subsector breakdown of the respondents.

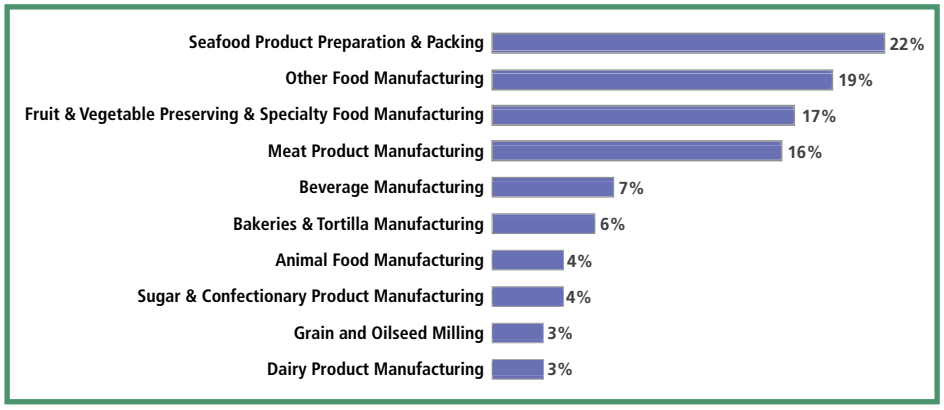


Figure 3: Graph identifying proportion of responders from each subsector

Respondents from the subsector "other food manufacturing" included those from sector-wide occupations such as: HR/Recruiting, Consulting, Education and Government.

A further sub-sector analysis was conducted to identify occupations that are rated as high demand. The analysis is based on a total number of 240 respondents who answered the question identifying high, medium and low priority occupations within their sector. Production Workers, Skilled Workers and Quality Control Technicians continue to be high priority across the subsectors; however there are a few differences between the subsectors.

For example, in the Beverage Manufacturing subsector, Business Administration Workers (47%) are third after, Production Workers (56%) and Skilled Workers (50%). In the Bakeries and Tortilla Manufacturing subsector, the demand for Supervisors is tied with the demand for Skilled Workers at 46%. The Animal Food Manufacturing subsector also has a high demand for supervisors at 30%. The respondents in the Grain and Oilseed milling subsector also selected Business and Administration at equally high importance as Quality Control Technicians at 25%.

The Sugar and Confectionary Product Manufacturing respondents identified Mechanics and Technicians in high demand with 38% and 33% response rate respectively. Mechanics are also important in the Dairy Product Manufacturing subsector tying in importance with Skilled Workers at 40%.

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Table 1 shows the top three high demand occupations by subsector. The percentage is based on the number of respondents from each subsector selecting the occupation as a high priority, divided by the total number of respondents from that subsector.

Table 1: Priority Occupations by Subsector

	Seafood Product Preparation and Packing	Fruit & Vegetable Preserving and Specialty Food Manufacturing	Meat Product Manufacturing	Other Food Manufacturing	Beverage Manufacturing	Bakeries & Tortilla Manufacturing	Animal Food Manufacturing	Grain and Oilseed Milling	Sugar and Confectionary Product Manufacturing.	Dairy Product Manufacturing
Production Workers	61%	43%	44%	43%	56%	31%	40%	38%	25%	20%
Quality Control Technicians	54%	29%	33%	44%	24%	21%	30%	25%	13%	20%
Skilled Workers	44%	33%	47%	46%	50%	43%	40%	13%	25%	40%
Supervisors	35%	14%	31%	31%	28%	43%	30%	0%	13%	20%
Sanitation Workers	33%	19%	30%	30%	17%	13%	20%	0%	13%	20%
Engineers	31%	9%	26%	26%	18%	7%	10%	0%	13%	0%
Electricians	29%	14%	19%	23%	29%	14%	10%	0%	25%	20%
Business and Administration	20%	21%	10%	38%	47%	0%	20%	25%	0%	20%
Technicians	19%	10%	12%	21%	24%	14%	20%	0%	33%	0%
Machinists	19%	12%	16%	25%	18%	0%	20%	0%	22%	20%
Maintenance Workers	17%	26%	48%	21%	12%	29%	20%	13%	25%	20%
Mechanics	15%	21%	26%	26%	29%	29%	20%	0%	38%	40%
Senior Management	13%	17%	17%	23%	22%	14%	20%	0%	13%	0%
Researchers	13%	19%	16%	26%	12%	7%	20%	0%	0%	0%
Total Number of Respondents	**55**	**42**	**42**	**39**	**17**	**14**	**10**	**8**	**8**	**5**

The most common barrier identified to filling the occupations high in demand was a lack of qualified people, followed by low pay and a lack of on the job training. Table 2 lists the occupations and the primary reasons identified as barriers to filling the position. The total represents the number of respondents who identified the position as difficult to fill..

Table 2: Priority Occupation by Barrier to Filling Position

	Lack of skills/ education		Lack of on-the- job training		Lack of qualified people		Poor working conditions		Shift work		Low pay		Total
Occupation	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Production Workers	29	14%	10	5%	59	29%	12	6%	32	16%	59	29%	201
Skilled Workers	35	21%	12	7%	75	46%	5	3%	8	5%	29	18%	164
Quality Control Technicians	23	16%	12	8%	69	48%	3	2%	10	7%	26	18%	143
Supervisors	32	23%	15	11%	60	44%	4	3%	10	7%	16	12%	137
Maintenance Workers	12	9%	10	7%	54	39%	8	6%	18	13%	35	26%	137
Sanitation Workers	8	6%	6	5%	38	29%	7	5%	36	28%	35	27%	130
Mechanics	9	8%	8	7%	56	50%	2	2%	13	12%	24	21%	112
Business and Administration	18	18%	7	7%	44	43%	0	0%	3	3%	30	29%	102
Electricians	11	12%	5	5%	49	52%	2	2%	6	6%	22	23%	95
Engineers	8	9%	4	5%	40	47%	2	2%	7	8%	24	28%	85
Machinists	6	8%	8	11%	29	39%	3	4%	7	9%	22	29%	75
Senior Management	15	17%	9	10%	41	48%	1	1%	2	2%	18	21%	86
Technicians	18	20%	7	8%	42	46%	3	3%	8	9%	13	14%	91
Researchers	**15**	**24%**	**4**	**6%**	**28**	**45%**	**1**	**2%**	**2**	**3%**	**12**	**19%**	**62**

Some of the other barriers identified were competition for skilled workers and higher wages from other industries, such as the oil and gas industry in Alberta and the Maritimes. Another common barrier identified was difficulty finding qualified workers to fill specific positions (e.g., animal slaughter). Additional barriers cited were the seasonal nature of some jobs and remote work locations that are not attractive to some workers, which makes it difficult to find people overall.

The figure below illustrates the barriers to filling the top five identified occupations in high demand.

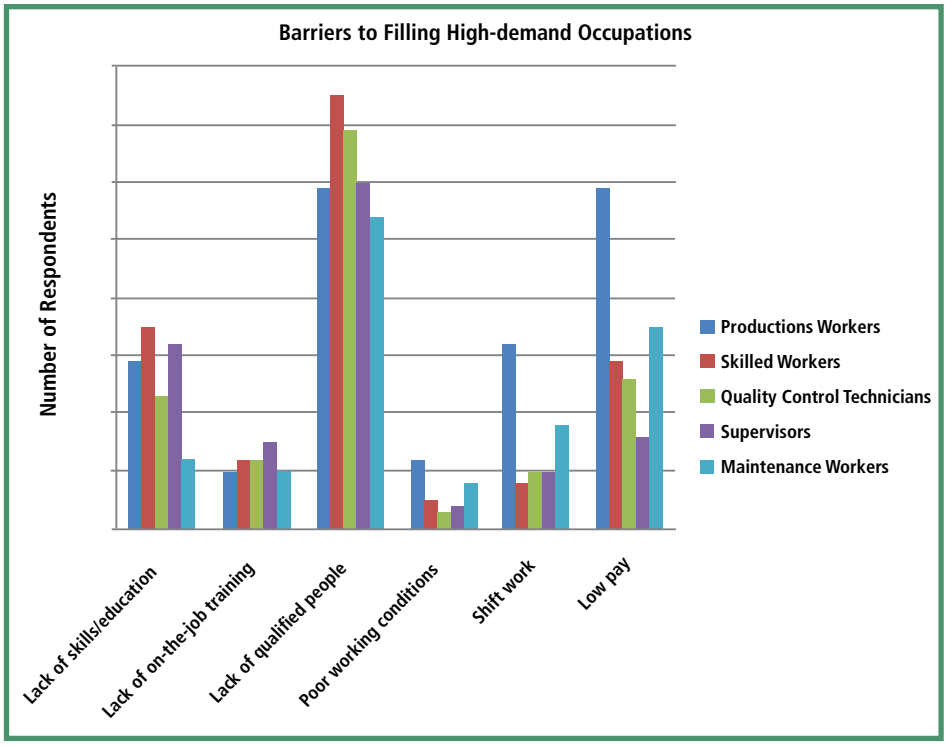

Figure 4: Chart identifying the barriers for filling high demand occupations.

Previous and current research indicates a common and consistent theme to skills in demand within key functional areas sector-wide.

2.3 Skills in Demand

As indicated in the sector and labour trends, the food and beverage manufacturing sector faces several skill challenges, especially as they relate to increased government regulations, food safety, availability of labour and adoption of new technologies. Previous and current research indicates a common and consistent theme to skills in demand within key functional areas sector-wide.

A sector scan indicated the following skills in demand:

Food safety

Increased government regulations and food safety requirements have affected the skill requirements of industry employees and increased the burden on businesses to provide food processing training.

Technical skills

Training remains a critical challenge for businesses in the food and beverage manufacturing industry, especially SMEs. New hires, in particular production workers, generally have very little experience and knowledge of the industry and require extensive on-the-job training. As technologies are adopted, training of employees becomes imperative so that employees can use, troubleshoot and maintain new technology. Additionally, current research indicates that training related to general knowledge of production technology and manufacturing processes is required across the sector with specific manufacturing practices (e.g. meat manufacturing practices) occurring at the subsector level.

Inventory management

As improving cost control and product traceability continues to gain importance, the demand for inventory management systems increases. As a result, workers need the skills to understand and utilize these systems and the technologies associated with them.

As technologies are adopted, training of employees becomes imperative so that employees can use, troubleshoot and maintain new technology.

Language skills (English/French)

There is a high proportion of older workers in the food and beverage processing industry. New immigrants will continue to fill in the gaps left by older workers retiring; however, many immigrants will require training in English or French as a second or third language. Skills and technical upgrading programs will be a challenge unless accompanied with appropriate Essential Skills and English/French as second language training.

Computer literacy

On average, the education levels of production workers within the food and beverage manufacturing industry are below those of many other industries[11]. Workers need access to learning programs that support the development of emerging computer-based skills required for most manufacturing occupations. Most companies, however, do not have training programs in place to support this development.

Within all sectors and across businesses of all sizes, workers need the ability to adapt and learn about food safety, health and safety, manufacturing processes and machinery for complex automated systems. In addition, there is a need to improve basic skills and employability skills amongst those in production roles. This will ensure that employers have the opportunity to "grow their own" from the existing workforce when businesses expand and require managers and supervisors.

[11] Toronto Labour Force Readiness Plan, 2004

2.3.1 Needs Assessment of Skills in Demand

The results from preliminary interviews of industry representatives support sector scan findings regarding skills in demand. Below is a summary of the interview results. Appendix 2 provides a more detailed description.

Skills in demand sector wide:

- Essential Skills*[12] (literacy, computer use, thinking, oral communications, working with others, continuous learning)
- Food Safety Training (Hazard Analysis Critical Control Points)
- Health & Safety Training (Workplace Hazardous Materials Information System, Commission de la santé et de la sécurité du travail du Québec, Workplace Safety and Insurance Board, Ontario)
- General Production Technology and Manufacturing Practices
- Quality Control

Additional skills were identified as being crucial based on the functional area. A functional area is defined as a common grouping of occupations that are unique within a sector (e.g., Machinists, Millwrights, Precision Workers are all grouped under the Technical/ Machine Operation Functional area).

Skills in Demand by Functional Area

- Lean manufacturing
- Good manufacturing practices (GMP)
- Food regulations
- Decision making
- Equipment and machine operation
- Maintenance and mechanical skills
- Statistical process control
- Waste management skills
- Traceability standards
- Liquid handling skills

These skills can be specific to a functional area or sector-wide, depending on industry needs.

Many of the skills identified by employers were considered to be high priority (i.e., skills that are difficult to find and are essential to satisfying important functional needs).

The survey results support the findings from the sector scan and key informant interviews. The following skills were identified as highest priority:

* Essential Skills are defined as the generic, transferable and enabling skills that: are used in daily life and in all occupations; help people participate fully in their workplace and community and adapt to change; and, provide a foundation for learning other skills. There are nine essential skills as defined by Human Resources and Skills Development Canada (HRSDC): Reading, Writing, Document Use, Oral Communication, Numeracy, Thinking Skills, Working with Others, Computer Use and Continuous Learning.

[12] Human Resources and Skills Development Canada, 2011, http://www.rhdcc-hrsdc.gc.ca/eng/workplaceskills/LES/definitions/definitions.shtml

1. Communication (e.g., reading, writing, speaking)
2. Good Manufacturing Practices
3. Problem Solving

The second highest priority skills were:

4. Equipment and Machine Operation
5. Numeracy (measurement and calculation)

The essential skills category was separated into Communication, Problem Solving and Numeracy Skills, to better identify the unique sector needs; however, all these skills will be combined under the Essential Skills category for standards development.

Many of the skills identified by employers were considered to be high priority

Good Manufacturing Practices and Continuous Improvement Practices were identified as important, but only after the first and second priority skills.

The priority knowledge areas identified are:

1. Food Safety Standards
2. Health and Safety Standards
3. Traceability Standards
4. Waste Management Standards
5. Liquid Handling Standards

The following page lists the skills and knowledge areas identified by priority.

Table 3: Skills Identified by Priority

Priority	1		2		3		4		5		Total
Skill	No.	%	No.	%	No.	%	No.	%	No.	%	
Communication (e.g., reading, writing, speaking)	67	39%	23	13%	24	14%	22	13%	35	20%	171
Good Manufacturing Practices	46	28%	30	18%	39	24%	29	18%	21	13%	165
Problem Solving	36	20%	46	25%	49	27%	30	16%	21	12%	182
Equipment and Machine Operation	31	21%	40	26%	19	13%	27	18%	34	23%	151
Numeracy (measurement and calculation)	10	9%	34	30%	28	24%	27	23%	16	14%	115
Continuous Improvement Practices	28	18%	18	12%	22	14%	34	22%	51	33%	153
Mechanical	21	21%	14	14%	25	25%	25	25%	16	16%	101
Lean Manufacturing Processes	13	13%	19	20%	21	22%	25	26%	19	20%	97
Statistical Process Control	5	11%	7	15%	10	22%	12	26%	12	26%	46

In addition, the priority knowledge areas identified were:

Table 4: Knowledge Areas Identified by Priority

Priority	1		2		3		4		5		
Skill	No.	%	No.	%	No.	%	No.	%	No.	%	Total
Food Safety Standards	155	69%	41	18%	7	3%	5	2%	18	8%	226
Health and Safety Standards	46	20%	121	53%	37	16%	19	8%	7	3%	230
Traceability Standards	5	2%	42	19%	102	46%	51	23%	20	9%	220
Waste Management Standards	10	5%	13	6%	55	25%	104	47%	39	18%	221
Liquid Handling Standards	14	6%	7	3%	20	9%	40	18%	140	63%	221

The research suggests that rather than focusing on occupation specific skills, the demands of technology and regulations will require a more broad-based, holistic approach to identifying skills standards and to training workers in many core and key function skill areas of the industry[13].

2.4 Training and Development Trends

A critical barrier associated with improving the skills of food processing employees is the cost. Another barrier is the lack of standards to describe the skills requirements to which training could be developed and compared.

The sector scan and preliminary interviews revealed that many employers felt training venues were limited and dispersed. Training programs are not transferable across industry and do not necessarily provide sufficient training for the skill in demand by employers. Additionally many smaller companies were either unwilling or unable to invest in extensive on-the-job training.[14]

The research[15] suggests that partnerships are limited between the food and beverage industry and educational institutes, and as a result, many employers felt programs were not relevant to the industry. There is an opportunity for the food and beverage industry to work together with the educational institutions to develop standards for training which could be streamlined across the food and beverage industry and lead to recognition and certification

[13] Manufacturing Skills Australia, Australian Core Skills Framework (A Summary), 2008 United Kingdom Sector Skills Assessment for the Food and Drink Manufacturing and Processing Industry: Summary Report, 2010 Improve, 2010, http://improveltd.co.uk/england/occupational-and-functional-maps-england

[14] National Seafood Sector Council, Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008 United Kingdom Sector Skills Assessment for the Food and Drink Manufacturing and Processing Industry: Summary Report, 2010 Improve, 2010, http://improveltd.co.uk/england/occupational-and-functional-maps-england

[15] Diagnostic Assessment and Definition of the Food Industry in Canada, National Seafood Sector Council, March, 2008

of skills. Several Canadian sector councils have been successful in leveraging standards to develop voluntary training and certification programs. These councils include the Canadian Tourism Human Resource Council, the Construction Sector Council and the Canadian Trucking Human Resource Council. For the food and beverage processing industry, key benefits of sector-wide certification include a reduction in training costs for food processing companies when they hire employees and recognition of employees as having the skills required to perform a specific job function.

Research conducted on existing national and provincial training facilities and programs[16] reveals that at the time of research there were 19 food and beverage processing pilot plant facilities throughout Canada and 95 provincial training programs and initiatives. Most federal programs offered training for:

- Food Safety
- Health and Safety
- Skill specific/technical training (food and beverage plant and processing operations)
- Documentation/Regulation Training

Provincial programs and initiatives offered in addition to those listed above include:

- New Canadian training
- Computer literacy
- Work ethics/business attitudes
- Management training

The number of available programs points toward an opportunity for greater partnerships between the food and beverage manufacturing industry and training and education institutions.

Such prospects need to be industry driven to ensure occupation and training standards are relevant to the industry and its evolving needs. In addition, occupational and training standards need to be applicable and useful sector wide. Given the commonality of core and essential skills requirements across subsectors, it will be important that any such initiatives be streamlined in approach to minimize standards development and training costs, allow for skills recognition and transferability, and allow for job mobility between subsectors. Standards adoption by the industry should lead to certification that demonstrates competency and proficiency of job skills.

The majority of the survey respondents (70%) indicated that occupations in the food and beverage processing industry would benefit from having a certification...

2.5 Labour and Skills Trends and NOS Development

The majority of the survey respondents (70%) indicated that occupations in the food and beverage processing industry would benefit from having a certification (i.e., where the workers skills would be standardized and accepted throughout the industry). Some

[16] National Seafood Sector Council, Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008

respondents who did not feel that certification was required; the most common reasons given were that it was not necessary as employees can learn on the job or that the process of certification is too complicated. For these reasons, it would be important that standards that are developed support the skills that can be taught on the job (e.g., food safety or health and safety standards that can be incorporated into employee training) and that obtaining certification is made accessible (e.g., in the form of on-the-job evaluation or checklist).

For standards to have the greatest industry reach and adoption, they must reflect not only the occupa-tional specific skills but also the skills required across the industry and those within functional areas* of food and beverage manufacturing. It would therefore be advantageous for the sector to develop skills-based standards that could be sector or function wide, while streamlining the development of occupation based standards to only those standards that are unique to that occupation.[17]

* For this report, functional area competency standards are defined as the skills and ability to perform, within an acceptable range, activities common to a functional area; jobs or job roles are defined by particular skills sets within a functional area; and occupational standards are defined as skills specific to an occupation.

Using this approach the skills in demand that are identified above can be organized by sector, functional area and occupation, from which standards can be developed. Sector-wide standards are those that are core or common to all employees across the sector and include essential skills such as basic literacy and numerical skills, as well as core or common skills, which refer to skills that are critical across the food and beverage processing sector. Functional area standards are specific to a functional area, e.g., Management, Technical/ Machine Operation, Production, etc., and may be sector-wide or sector-specific, depending on the skill. For example, a machinist may have sector-wide standards (e.g., ability to troubleshoot basic mechanical problems) and may also have sector-specific standards (e.g., working with a filleting machine). Occupation specific standards consist of skills that are unique to that occupation (e.g., a Production Worker). If further delineation is required, occupational standards can be further divided by subsector (e.g., Production Worker in the meat processing industry versus a Production Worker in the fruit and vegetable processing industry).

[17] New Zealand National Qualifications Framework (NQF), New Zealand Industry Training Federation
Australian Government: Department of Education, Employment and Workplace Relations, Australian Core Skills Framework (A Summary), 2008
http://www.deewr.gov.au/Skills/Programs/LitandNum/WorkplaceEnglishLanguageandLiteracy/Documents/ACSF-summaryfinaltoprint2.pdf
National Centre for Vocational Education Research (NCVER), http://www.ncver.edu.au/
Technical and Vocational Education and Training (TVET) Portal, http://www.tvet-forum.net/index.php?id=20
Manufacturing Skills Australia, http://www.mskills.com.au/
International Labour Organization (ILO) Homepage, http://www.ilo.org/global/about-the-ilo/lang--en/index.htm
The Food and Drink Manufacturing & Processing Industry: Wales Sector Skills Assessment December, 2010

[18] Human Resources and Skills Development Canada, 2011, http://www.rhdcc-hrsdc.gc.ca/eng/workplaceskills/LES/definitions/definitions.shtml

Below is a breakdown of Important or Key Skills groupings.

Sector-wide Essential Skills[18]:

- Communication – Reading, Writing, Document Use, Oral communication
- Language Skills – English and/or French
- Problem Solving/Thinking
- Numeracy Skills
- Computer Use
- Working with Others
- Continuous Learning

Sector-wide Core Skills:

- Good Manufacturing Practices
- Continuous Improvement Practices

Sector-wide Core Knowledge Areas:

- Food Safety Standards
- Health and Safety Standards
- Traceability Standards
- Waste Management Standards
- Liquid Handling Standards

Functional Area Skills: (e.g., Production)

- Equipment and Machine Operation

Functional Area Skills: (e.g., Management/Administrative)

- Lean Manufacturing
- Good Manufacturing Practices (GMP)
- Food Regulations
- Decision Making

Occupation Specific Skills: (e.g. Machine Operators within Production)

- Maintenance and Mechanical Skills
- Statistical Process Control

Looking at standards in this manner illustrates a streamlined modular approach would work well in analyzing and determining skill requirements within the food and beverage industry.

[19] National Centre for Vocational Education Research (NCVER) http://www.ncver.edu.au/
The Food and Drink Manufacturing & Processing Industry: Wales Sector Skills Assessment December, 2010
Australian Government: Department of Education, Employment and Workplace Relations, Australian Core Skills Framework (A Summary), 2008 http://www.deewr.gov.au/Skills/Programs/LitandNum/WorkplaceEnglishLanguageandLiteracy/Documents/ACSFsummaryfinaltoprint2.pdf
United Nations Educational, Scientific, and Cultural Organization (UNESCO) http://www.unesco.org/new/en/unesco/

Looking at standards in this manner illustrates a streamlined modular approach would work well in analyzing and determining skill requirements within the food and beverage industry. This type of approach would help to develop relevant training, allowing training initially to target priority areas (e.g., high demand occupations) to support skills in demand and ensure that training development is industry driven.[19]

2.5.1 Considerations for NOS Development

The Canadian food and beverage processing industry is being driven by a number of complex factors including: evolving technology and innovation; complex regulation and requirements; environmental change and the transition to a more highly skilled workforce. These factors must be considered when determining NOS approaches.

The Canadian food and beverage processing industry is being driven by a number of complex factors...

Food and beverage businesses are adapting to technology, including automation and inventory control, in varying degrees. One outcome to different levels of technology uptake is that the key skills required at the occupation level will vary. Consequently, occupation based NOS for the sector would be difficult to capture.

A modular standards approach that identifies the core skills sets (e.g. food safety, food labeling and health and safety) required within a functional area will allow for the development of standards that are sector-wide rather than occupation specific. Such an approach will be easier to use and more flexible to modify and update due to changes and demands. This is an important consideration for selecting an NOS approach to standards development.

The following section provides an overview of NOS approaches used within other national and international industries that closely follows the competency or skill-based NOS development methodology.

3.0 NOS Profile/ Methodology Review

The following section will discuss: trends in standards methodologies, and frameworks; current and evolving NOS/Profile frameworks used by Canadian sector councils and International and National manufacturing industry sectors to determine their applicability to the Canadian food and beverage processing industry. It will also provide an overview of how NOS frameworks and standards have led to certification and skill recognition and the uptake of these standards by industry.

A national and international review was conducted in order to determine the viability of various existing NOS/Profile methodologies...

3.1 Review of Current NOS/Profile Methodologies

A national and international review was conducted in order to determine the viability of various existing NOS/Profile methodologies from other sector/jurisdictions as the foundation for developing an NOS framework for the food and beverage processing sector. After an initial scan a more in-depth review was conducted, which focused on both national and international manufacturing industry sectors and international regional areas with current and developing occupational standards. Industry Sectors and regional frameworks examined in this review include:

- Canadian Printing Industry Sector Council (CPISC)
- Canadian Supply Chain Sector Council (CSCSC)
- Canadian Plastics Sector Council (CPSC)

- Wood Manufacturing Council (WMC)
- Canadian Tourism Human Resource Council (CTHRC),
- Food and Drink Manufacturing and Processing, UK, (FDMP)
- Regional Model Competency Standards for Asia and the Pacific
- Food Processing HR Council (FPHRC)

These methodologies and frameworks were chosen as comparative models due to the commonality of trends and needs with FPHRC, specifically in human resource, labour market and technological advances, and the use of supply chain management within manufacturing. The results of this review helped to guide the recommendations outlined in the next section. Below is a summary of NOS approaches (see Appendix 3 for a more in-depth NOS/Profile Methodology Review).

The results of this review helped to guide the recommendations...

3.1.1 Summary of NOS Approaches

Canadian Printing Industry Sector Council is currently using a Streamlined Occupational Standard Approach that reflects all aspects of the industry in an integrated manner and that mirrors the way the industry is organized and functions. For each process area, CPISC is developing three types of skill standards:

- Essential Skills (basic or essential to all occupations)
- Core Skills (broad-base knowledge of the industry)
- Operating Skills (specific operating functions within a process area)

Wood Manufacturing Council is using a more traditional approach to NOS development. Standards are built based on the progressive knowledge required by a particular occupation. Skills are identified in three broad skill areas:

- Foundation skills
- Sector related skills
- Occupational specific skills

Canadian Plastics Sector Council is using a competency/skill-based approach to develop standards by process area within the industry. This reflects the wide variety of skills requirements depending on the process area. The council is using a competency-based approach that identifies a combination of competencies (skills and knowledge) required to perform a specific function within process area.

Canadian Supply Chain Sector Council has developed job description type standards within 7 functional areas.

Food and Drink Skills Council (FDSC), UK, is currently using a Streamlined Occupational Standard Approach that reflects all aspects of the industry in an integrated manner and that mirrors the way the industry is organized and functions. The approach has been the creation of an occupational map to be used with a functional map.

The Occupational Map breaks down jobs within functional areas. The functional map consists of a functional analysis for each of the occupational areas to determine the different types of skills and knowledge required to be competent in these roles. It covers both the process knowledge as well as any relevant technical and scientific knowledge. The two maps are designed to show the link between occupations, functions, NOS and qualifications.

International Labour Organization is using Regional Model Competency Standards (RMCS) that encompass broader industry, industry subsector or occupational cluster coverage. This type of standard reflects the complex and diverse structure of businesses within industries. It develops skills standards made up of primary function areas and the skill units within the areas.

Food Processing HR Council has currently developed an occupational standard for a Food Process Operator. With the occupational standard, FPHRC has adopted a more traditional approach to NOS development; however the standard can be used to extrapolate core and functional standards that can be modified to be applicable more broadly across the sector.

National and International research indicates that the organization of work has dramatically changed over the last 20 years.

3.1.2 Factors Influencing Changes to NOS Development Methodologies

National and International research indicates that the organization of work has dramatically changed over the last 20 years. This is especially true for manufacturing industries. As a result, occupations have become more complex and require greater competency across broader key functional areas, in addition to job specific skills. These changes have caused an evolution away from traditional task-based (occupation based) standards development approaches where occupations were used as a basis for clustering competencies. Traditional occupational skill standards methodologies are no longer a viable option as they are cumbersome to develop and do not meet the needs of the subsectors and functional areas within many industries[20].

These factors have resulted in the trend toward the adoption of broader competence-based approaches to occupational analysis and standards during the past 10-15 years. Several Canadian and international industries have adopted this approach to sector-wide competency/skill based standards using modules or units to identify the skills required of all workers within a functional area. Specifically, the United Kingdom Food and Drink Skills Council, Canadian Printing Industries Sector Council and International Labour Organization – Asia and Pacific have developed such an approach. Additionally, sector-wide and occupational cluster coverage underpins the methodologies currently adopted by Canadian Supply Chain Sector Council, Canadian Plastics Sector Council and the Canadian Tourism Human Resource Sector Council.

As noted, new methods for occupational analysis are being developed because of changes to the organization of work and changes to workplace processes and systems. This is especially true within manufacturing industries where integration of job roles within and

[20] Guidelines for Development of Regional Model Competency Standards (RMCS), International Labour Organization (ILO), 2006, http://www.ilo.org/asia/whatwedo/publications/lang--en/docName--WCMS_BK_PB_234_EN/index.htm

across functional areas is critical for productivity and efficiency. As a result, attention has shifted from analyzing discrete job tasks to analysis of broader functional area competencies. Definitions of competencies vary and this is reflected in the differences in the approach to the development of standards taken by different industry sectors in Canada and internationally. Most commonly, competency standards are defined as the skills and ability to perform, within an acceptable range, activities common to a functional area[21].

3.2 Competency-based NOS Frameworks

Sector-wide competency standards are often developed with a focus on key generic areas of competence including administration, management, leadership, quality assurance, operations, food safety, health and safety, inventory management, production knowledge, essential skills, etc. This type of standards methodology and structure allows for:

The report also acknowledges the Food and Drink Sector Skills Council's NOS/Profile framework as a key factor in supporting the development of occupational standards

- Easy identification of the relevant sector specific standards for a particular occupation which can then be combined to build occupational standards;
- Ease of use by all stakeholders and end users of the standards;
- A streamlined approach to skills assessment and development of relevant training;
- Certification and recognition of modular or unit based skill qualifications, at various levels.

Additionally, such standards will foster better relations between industry and educators to ensure training is relevant to industry.

In the UK the food and drink industry was recognized as an example of a "successful UK advanced Manufacturing sector" in the UK governments recent Growth Review Framework for Advanced Manufacturing. The report also acknowledges the Food and Drink Sector Skills Council's NOS/Profile framework as a key factor in supporting the development of occupational standards, identifying skills gaps, increasing qualifications, influencing policies relating to industry practice, developing training and creating job profiles and other recruitment materials within the Food and Drink Industry Sector.

The labour market information (LMI) Intelligence Research Project commissioned by the FPHRC and sourced in this report highlights a high level of congruency of industry trends, needs and subsector and functional area structures between UK Food and Drink and the Canadian food and beverage processing industry. Both are facing the need to develop a NOS/Profile framework designed for the broader industry, industry subsector or occupational cluster coverage.

[20] United Kingdom Sector Skills Assessment for the Food and Drink Manufacturing and Processing Industry: Summary Report, 2010
Improve, 2010, http://improveltd.co.uk/england/occupational-and-functional-maps-england
United Nations Educational, Scientific, and Cultural Organization (UNESCO), http://www.unesco.org/new/en/unesco/ Competency Skills Implementation Guide, published by manufacturing, Engineering and related Services Industry Training Advisory Body Ltd., for Australian Industry Group and Metal Trades Federation Unions, 1999 http://www.mskills.com.au/DownloadManager/Downloads/Competency%20Standards%20Implementation%20Guide.pdf

3.2.1 Uptake and Use of Competency-based NOS Approaches

This section examines the uptake and feedback on how current competency/skill based standards are being used for certification and recognition of skills.

Canadian Tourism Human Resource Council (CTHRC)[22]

The CTHRC has developed NOSs for 40 occupations. These NOSs are used as the base to develop training workbooks and online training modules for voluntary certification training programs for 29 occupations. Certification can be achieved through in-person training programs and e-learning.

CTHRC currently has 126 partnership agreements signed between Tourism Human Resource Organizations (HRO) and other organizations across Canada to deliver the voluntary certification training. Additionally, colleges and private training organizations use the NOS and training workbooks to develop curriculum for their own programs.

Additionally, colleges and private training organizations use the NOS and training workbooks to develop curriculum for their own programs.

CTHRC is in the process of redesigning the training modules for the online certification program. The intent is to design training modules for common core skills such as customer service, professionalism, health and safety and being a tourism ambassador. These modules will be applicable to all occupations as opposed to the current model that has different material for all occupations.

Overall feedback and uptake is positive from industry and training organizations on NOSs and supporting training materials developed through CTHRC. Training organizations feel that their training programs are more relevant and reactive to the industry as a result of the NOSs. Employers of graduates from college hospitality programs agree that the open sourced availability of CTHRC NOS and training material supports colleges in developing appropriate curriculums. CTHRC is working at enhancing its current marketing and outreach strategy to continue to increase the awareness and penetration of their materials into the tourism industry.

Food and Drink Skills Council (FDSC)[23]

In the UK, the Sector Skills Councils (SSC) such as the FDSC, are responsible for the development of the frameworks for occupational qualifications (occupational standards). Awarding Organizations (colleges, universities and private training organizations) are responsible for the development of qualification training and performance indicators based on the occupational standards and are subject to government rules and regulations regarding qualifications.

In conjunction with the development of the modular standards framework FDSC established a National Skills Academy (NSA) to develop a specialized training provision network to improve the availability of quality training providers. Working with these training organizations, the FDSC developed training materials for the skills which were shown

[22] Canadian Tourism Human Resource Council, http://cthrc.ca/en

[23] Food and Drink Skills Council, http://improveltd.co.uk/

to be the most in demand (lean manufacturing, food safety and health and safety). Through the partnership with FDSC, many of the training providers developed specialist skills and became champions for the whole certification process. The academy now has approximately 70 training providers with expertise using the new modular occupational standards and qualifications.

Based on these skills in demand, the FDSC developed the Food Manufacturing Excellence qualifications. These qualifications support employers in efforts to embed lean manufacturing to encourage sustainability and competitiveness of the industry. The National Vocational Qualifications (NVQ) for lean manufacturing is available for Levels 2 (e.g. production operations workers), Level 3 (e.g. team leads and technical managers), and Level 4 (e.g. production and continuous improvement managers). Additional units on food safety are embedded within the lean manufacturing training units. The Food Manufacturing Excellence qualifications have seen the most industry uptake and have generated over £2 million since it was started. FDSC felt it would have been very difficult to develop lean manufacturing qualifications without a modular approach.

These skills standards are modular in approach which makes them applicable across many occupations.

FDSC is currently supporting the India Food Sector Council, the fastest growing industry in India, to develop an approach similar to the FDSC model. The FDSC is developing a modified model that puts responsibility and ownership of occupational qualifications, awarding organizations, licensing and skills academy under one umbrella organization to better leverage support and funding and ensure sustainability.

Canadian Printing Industry Sector Council (CPISC)[24]

In 2007, CPISC launched *Skills for the Future*. Through this project, CPSIC has developed six skills standards for the industry's major process areas: prepress, press, bindery, finishing, colour specialist and output specialist. Within the production support process area, skill standards for three sub-processes—sales, estimating and customer service and production coordinators have also been completed. CPSIC recently released two new skills standards for Production Managers and Print Executives.

These skills standards are modular in approach which makes them applicable across many occupations. All skills standards are in the format of essential, core and operating skills. The *Essential Skills* highlight the basic skills that are essential in every occupation. The *Core Skills* cover those elements that comprise a broad-based knowledge of the industry. Some core skills will cut across process areas, although some may be more relevant to a particular process area. The *Operating Skills* relate to specific operating functions within a process area. A function is defined as a set of related work activities organized in either chronological or operational order that often cut across occupations. In other words, functions are not highly specific job tasks but groups of related activities. For example, for the prepress process area, operating skills include such operations as performing pre-flight operations, managing assets, manipulating images and making file revisions. All prepress operators must have or acquire these specific operating skills to perform their duties.

[24] Canadian Printing Industry Sector Council http://www.cpisc-csic.ca/eng/index.cfm

In addition to the Skill Standards, CPISC has developed 12 occupational profiles for key occupations. The profiles outline what is required of the worker in a specific job, the availability of similar jobs in Canada and the kind of education and personal attributes that best contribute to success in that occupation.

The Skills standards have been distributed in print format to committee members, focus group participants, online validation respondents, suppliers, educators and employers. To date CPSIC has distributed over 1300 copies of the press and prepress standards and over 200 standards for other process areas.

Overall feedback and uptake for the skills standards has been positive from industry and training organizations. Industry (through committee involvement and validation) has expressed support and agreement of the standards. Sector council staff reported that companies have used the standards to update, develop or tailor in-house training, as well as to develop job descriptions and job postings. This includes representation from employers, employees, union, suppliers, associations and educators. Educators have been the greatest supporters and ambassadors of the skills standards and use them to update and map their curricula to the standards. In October 2011, CPISC commissioned a labour market information (LMI) study which includes collecting data on the usage of standards for training and skills development.

Overall feedback and uptake for the skills standards has been positive from industry and training organizations. Industry (through committee involvement and validation) has expressed support and agreement of the standards.

With growing acceptance of the Skill Standards by businesses and training institutions across the country, the next undertaking by CPISC is to create recognition for individuals who meet the standards. CPISC is currently developing an accreditation program (based on the skills standards) which it hopes to have available to industry by spring 2012. As 87% of the companies in the sector have less than 10 employees, finding the resources to do training is a big challenge and issue for the industry. The mission of the accreditation program is to ensure alignment of skill standards with academic and training institution programs and to ease access to training for industry.

Construction Sector Council (CSC)[25]

The Construction Sector Council has developed 27 skills standards for Operating Engineer Occupations which are occupation specific, but also recognize the common core skills required of the sub-sectors within the construction industry. The sub-sectors include: Home Building and Renovation (HBR), Industrial/Commercial/Institutional (ICI), Heavy Industrial (HVY), and Civil Engineering (CIV). Additionally CSC developed a skills standard for Frontline Supervisors which encompasses the many occupations involved in the function area of first level supervision, across all construction sub-sectors and trades. The Skills standard for Frontline supervision is in the format of the essential skills and technical knowledge and abilities required for frontline supervision activities and tasks.

[25] Construction Sector Council http://www.csc-ca.org/

CSC is currently developing a Skills Training Standard for Construction Planning. The skills standard is modular in its approach and encompasses the function area of construction planning applicable across all construction sub-sectors and trades. The skills standard for construction planning includes the essential skills and technical knowledge and abilities required within a construction planning process.

The CSC has used the skills standards to support the development of training courses and training materials. CSC currently offers 10 management and safety courses based on the skills standards. Additionally they offer 2 certification programs (building home building inspectors and building officials. Forty-six education institutions and training organizations are distributors of the CSC e-learning courses. Some of the training courses offered are accredited by the Canadian Construction Association (CCA) and the Gold Seal Certification Program. Many colleges and training organizations use the skills standards, workbooks and e-learner course materials for the development of their curriculums.

According to CSC representatives, feedback from industry and the distribution centres is that requests for skills standards and online training courses are high. In addition, many employers within the industry accept the CSC certificates as valid training. CSC is currently developing a method for tracking distribution of skills standards, uptake and completion of training courses, which they anticipate will be available in the spring of 2012.

The CSCSC first looked to stakeholders to prioritize its work, identifying seven functional areas and 26 occupations of the sector.

Canadian Supply Chain Sector Council (CSCSC)[26]

In 2009, CSCSC undertook a project to develop 15 National Occupational Standards. CSCSC used a fast-tracked occupational analysis process developed in conjunction with CSA Standards. The CSCSC first looked to stakeholders to prioritize its work, identifying seven functional areas and 26 occupations of the sector. It focused the development of NOS for occupations with the greatest need for support relating to developing job descriptions, competency profiles and job-performance tools. Each NOS is occupation specific and includes required qualifications and related work experience, a list of tasks, tools and technologies used on the job, a catalogue of the knowledge, skills and personal attributes and a list of essential-skills.

The CSCSC used the standards in the development of its National Accreditation Program (NAP), developed in partnership with the Canadian Standards Association and with significant input from supply chain stakeholders. The goal of the NAP is to recognize supply chain education and training programs that meet the Canadian Supply Chain Sector Council's national standard for accreditation. Both individual courses and full programs can be submitted for review by the Council's Accreditation Review Panel. To earn CSCSC accreditation, the course/program must meet all CSCSC Standards for Accreditation. To maintain CSCSC accreditation, evidence of continued compliance with the Standards for Accreditation needs to be provided. To date 39 programs and courses have been accredited by the Canadian Supply Chain Sector Council through the National Accreditation Program.

[26] Canadian Supply Chain Sector Council http://www.supplychaincanada.org/en/

The CSCSC has undertaken several pilot projects to test the viability of the standards with successful outcomes and positive feedback. Several companies described the standards as helpful in various areas including using the standards to develop:

- A pre-interview checklist to assist with telephone screening for recruitment purposes;
- Job descriptions and training plans to help individuals better understand their job requirements;
- Training which is reflective of the industry needs.

According to CSCSC representatives, the feedback from employers and educators is that the condensed format of the skills standards makes them easy to use, especially for development of job descriptions, training plans and recruitment processes.

CSCSC is currently developing a method for tracking distribution of occupational uptake and completion of training courses, which it anticipates will be available in the spring of 2012.

3.2.2 Applicability of Competency-based NOS Approach to the FPHRC

The Canadian Printing Industry Sector Council, Food and Drink Manufacturing and Processing, and many manufacturing sectors similar to FPHRC, have production processes that are highly integrated. These production processes vary widely in size of company, type of operating equipment, range of job titles and production output. As a result, many of the councils mentioned above have chosen to develop occupational standards that focus on functional areas and roles within manufacturing and production process. This methodology is streamlined in its approach and supports an industry with rapidly changing technologies and a need to ensure skills development, knowledge transfer and professional development for new and existing employees. This follows the current trend toward sector-wide competency/skill based standards using modules or units to identify the skills required of all workers within a functional area.

The goal of the NAP is to recognize supply chain education and training programs that meet the Canadian Supply Chain Sector Council's national standard for accreditation.

The outcome of this review is to recommend an NOS Development Framework that is:

- Streamlined in its development process
- Easy to implement and use
- Applicable for voluntary certification

As a result, the following section will provide a proposed functional structure methodology and a framework development approach.

4.0 Recommendations for NOS Development

All workers will need to be multi-skilled in the future and their knowledge of technology will need to expand beyond their own part of the production process.

As with other manufacturing sectors, the functions along the food and beverage production chain are highly integrated. As indicated in the sector scan and preliminary research, organizations will increasingly require adaptable, multi-skilled workers who can operate computers, analyze problems, make decisions, work cooperatively, operate and maintain equipment, understand and implement food safety, health and safety and inventory management systems and processes while having a solid understanding of the entire food and beverage production process. All workers will need to be multi-skilled in the future and their knowledge of technology will need to expand beyond their own part of the production process.

As industry-based standards are undertaken, they must take into account how the roles and responsibilities will differ within occupational areas and encompass the widest range of job roles within the sector. Research has also indicated that frameworks and ensuing tools must provide a wide range of applications.[27] They must also be quicker to develop and reactive to changing industry needs to ensure the uptake and support from within the food and beverage processing sector.

[27] National Seafood Sector Council, Diagnostic Assessment and Definition of the Food Industry in Canada Report, 2008
Food Processing Labour Market Information (LMI) Report, 2011
United Kingdom Sector Skills Assessment for the Food and Drink Manufacturing and Processing Industry: Summary Report, 2010
The Food and Drink Manufacturing & Processing Industry: Wales Sector Skills Assessment December, 2010

For skill standards and profiles to be useful, they must reflect this change in the industry by covering all aspects of the industry in an integrated manner, which would best be served by adopting a competency-based NOS development approach.

The competency-based NOS framework would encompass broader industry subsectors and functional areas, allowing for a multi-dimensional competency matrix that can leverage sector-wide and cross-sector commonalities and identify sector specific needs.

4.1 Proposed NOS Methodology

We propose that the FPHRC develop standards where various work functions are combined to describe whole jobs/occupations. The figure below shows how modular competency-based standards can be combined to develop occupation specific standards.

Figure 5: Grouping competency-based standards to develop occupational standards

Occupations within the food and beverage industry all have a need for a certain set of common or core skills such as food safety and health and safety; or essential skills such as basic communication and literacy skills. These skills can be developed into standards that apply across the sector.

Occupations can also be grouped by functional area where occupations within a functional area have a significant number of overlapping skills. The goal is to identify and develop standards for the common skills such that the occupation specific skills become much fewer in number. Below is a list of the proposed functional breakdown (blueprint) of the occupations for the food and beverage processing industry:

The goal is to identify and develop standards for the common skills such that the occupation specific skills become much fewer in number.

- Management
- Business, Finance and Administration
- Technical/Machine Operation
- Facility Operations and Maintenance
- Quality Control
- Supervisors
- Production
- Inputs and Outputs
- Research and Development

The remainder of the skills for which standards can be developed can be either occupation specific (i.e., unique to that occupation such as a millwright), or subsector specific (i.e., unique to that subsector such as millwright in a fish plant versus a millwright in a grain plant). The figure below shows the proposed Sector Framework.

Each functional area is a logical grouping of occupations with similar skills/competency requirements.

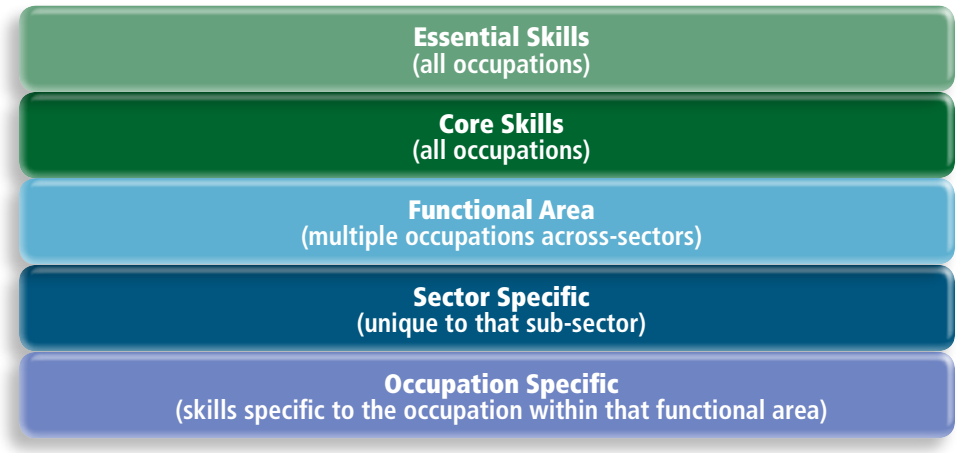

Figure 6: Proposed Food and Beverage Sector Framework

A modular approach allows end users to combine competency-based standards to build occupational criteria.

4.2 Framework Development Approach

To fully utilize and implement functional structure methodology as outlined above, we recommend the following development approach.

4.2.1 Phase 1

Create a sector-wide blueprint[28] that describes functional areas, key occupations, and key skills within each subsector of the food and beverage industry. Each functional area is a logical grouping of occupations with similar skills/competency requirements. The functional area will include a detailed breakdown of the occupations which it contains. The blueprint is used as a method of grouping occupations and associated skills.

[28] See Appendix 4 for draft Blueprint

Review and validate the blueprint groupings of skills and occupations by functional area. Using findings from the sector scan and needs assessment research, the skills can be further broken down in four main areas:

- **Essential Skills** – the skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change[29]
- **Core Skills** – the skills that are applicable across the entire Food and Beverage industry. For example, Essential Skills, Food Safety, Health and Safety, etc.
- **Functional Skills** – the skills that are unique to the functional area. For example, Production Functional Area – machine operation and maintenance, and statistical process control.
- **Subsector Skills** – the skills that are unique to the subsector. For example, perform bakery operations or meat production.
- **Occupation specific Skills** – the skills that are unique to the occupation. For example, computer programming and electronics.

Blueprint Review and Validation

The draft blueprint will be validated by industry through the national Advisory Committee (NAC). The intent of the validation will be to verify that:

- Functional areas are representative of the food and beverage industry (e.g., the blueprint captures the main functional areas and corresponding occupations).
- Primary or key occupations/roles are representative of each functional area
- Key skills are listed within each functional area
- Occupations are captured within the occupational groupings

4.2.2 Phase 2

Extrapolate Core and Functional area Skills from existing FPHRC standards

In order to expedite the competency-based standards development process, FPHRC can leverage the standards already developed for the Food Process Operator. For example, the current FPHRC Food Process Operator standard structure identifies Blocks, Tasks, Sub-tasks and Enabling Objectives that can be reviewed by subject matter experts (SMEs) who can then identify skills/competencies and associated standards that can be reorganized to develop core and functional standards.

...the current FPHRC Food Process Operator standard structure identifies Blocks, Tasks, Sub-tasks and Enabling Objectives that can be reviewed by subject matter experts (SMEs) who can then identify skills/competencies and associated standards that can be reorganized to develop core and functional standards.

[29] Human Resources and Skills Development Canada, 2011, http://www.rhdcc-hrsdc.gc.ca/eng/workplaceskills/LES/definitions/definitions.shtml

Organization of the Food Process Operator Standards

- **Blocks:** major divisions/groupings of tasks
- **Tasks:** distinct activities/steps to complete specific assignment
- **Sub-tasks:** distinct activities/steps to complete a task
- **Enabling Objectives:** knowledge and abilities required to perform activities

To determine which blocks are common or core to the industry and which are common to a functional area, the SMEs can first review the BLOCKS. For example, BLOCK C: Set-up and Operate Equipment from the table excerpt below can become a functional skill common across the Technical/Machine Operation Functional Block. The subject matter experts can then review BLOCK C and its associated tasks and identify if they apply across all subsectors or whether there are any sector specific tasks that need to be considered. The final product would then consist of a function-specific standard related to setting up and operating equipment. If there are tasks (i.e., standards) that are subsector specific they should be included as addendums, appendices or sector specific pamphlets (e.g., Food Process Operator in the Meat sector versus a Food Process Operator in the Fruit and Vegetable sector).

The final product would then consist of a function-specific standard related to setting up and operating equipment.

Table 5: BLOCK C: Set-up and Operate Equipment

TASK	SUB-TASK	SUPPORTING KNOWLEDGE AND ABILITIES
C4. Clean and sanitize equipment and tools	4.1 De-energize/lockout equipment 4.2 Follow cleaning manual as per equipment Standard Sanitation Operating Procedures (SSOPs) 4.3 Disassemble equipment, as required 4.4 Use proper cleaning and sanitizing chemicals and tools 4.5 Conduct swab test, if required 4.6 Conduct allergen test, if required 4.7 Consult Quality Assurance personnel to verify cleanliness 4.8 Complete checklist to verify that cleaning and sanitizing has taken place 4.9 Return chemicals and tools to secure storage areas 4.10 Reassemble equipment, as required	Knowledge of: – Standard Sanitation Operating Procedures (SSOPs) – cleaning and sanitizing chemicals, for example: – strength of chemicals or sanitizers – appropriate mixture or ratio for cleaning and sanitizing chemicals – titration – safe storage practices – food-safe and non food-safe chemicals – disposal process – cleaning and sanitizing equipment – Material Safety Data Sheet (MSDS) – Workplace Hazardous Materials Information System (WHMIS) – Etc. Ability to: – perform cleaning and sanitation tasks – operate cleaning and sanitation equipment

To determine which skills are core to the industry, subject matter experts can also review the tasks and sub-tasks. For example, Sub-Task 1.1 from the table excerpt below identifies "Follow Occupational Health and Safety standards and requirements." Based on this and other similar sub-tasks, a core Occupational Health and Safety Standards can be developed.

Table 6: BLOCK A: Occupational Skills

TASK	SUB-TASK	SUPPORTING KNOWLEDGE AND ABILITIES
A1. Perform work as per industry standards and practices	1.1 Follow Occupational Health and Safety standards and requirements	Knowledge of: – Occupational Health and Safety – emergency drills – location of emergency stations (e.g., eye wash stations) – location of fire extinguishers – proper ergonomics and lifting practices Ability to: – follow emergency procedures – complete all required Occupational Health and Safety training (e.g., first aid training) – sign off on hazards analysis – perform lockout procedures

Once the common core or functional standards are extrapolated they can be used to support the development of standards for a specific occupation such as machine operator for meat production manufacturing.

The benefit of this approach is that the common core skills are included within an occupational specific standard without having to redevelop those skill requirements from scratch. Once the common core or functional standards are extrapolated they can be used to support the development of standards for a specific occupation such as machine operator for meat production manufacturing. Hence, the core and functional area skills would already be validated and only the occupational specific standards need be developed.

Validate to ensure sector-wide applicability

The draft core and functional standards are validated by industry through the National Advisory Committee (NAC) or their designates. The intent of the validation will be to verify that:

- Core skills represent those required of all employees of the food and beverage industry
- Functional area skills represent those required of the production function area

The core and functional area skills need to be re-useable and should be used to make any additions that are sector specific.

4.2.3 Phase 3

Select occupations that are high in demand to develop standards

When developing occupation specific standards, they should be as sector wide as possible (e.g., Quality Control Operator Standards) in order to serve as an umbrella category. If sector specific Quality Control Operator Standards are required (e.g., Quality Control Operator – Meat), they should be fairly brief and complimentary to the overall Quality Control Operator Standard.

Compile the Core and Functional skills that are applicable

...it is very important that the functional or sector specific SMEs are familiar with the whole architecture when developing occupation or sector specific standards in order to avoid duplication of standards.

When developing competency-based standards that are modular in nature, it is very important that the functional or sector specific SMEs are familiar with the whole architecture when developing occupation or sector specific standards in order to avoid duplication of standards. Ideally, they should review and agree on the core and functional standards that will be included in the occupational standard before developing occupation specific standards.

4.2.4 Phase 4

Conduct a needs/gap analysis to identify occupation specific skills that are missing

Once all the core and functional standards are in place, the work required to develop occupation specific skills would be substantially reduced as most of the standards development work will have been covered.

Identify any unique skills that are sector-specific

Similarly, skills that are unique to the sector should be fairly few.

5.0 Conclusion

The food and beverage industry is faced with increasing technological demands, a declining and aging workforce, increased regulation, and a growing immigrant labour pool without the requisite skills and qualifications. In order to be reactive to these challenges the food and beverage manufacturing industry needs to upgrade and retrain the current workforce while ensuring that bright and motivated people are attracted to the industry.

As with other manufacturing sectors, the functions along the food and beverage production chain are highly integrated. As indicated in the sector scan and primary research, organizations will increasingly require adaptable, multi-skilled workers who can operate computers, analyze problems, make decisions, work cooperatively, operate and maintain equipment, understand and implement food safety, health and safety and inventory management systems and processes while having a solid understanding of the entire food and beverage production process.

In order to be reactive to these challenges the food and beverage manufacturing industry needs to upgrade and retrain the current workforce while ensuring that bright and motivated people are attracted to the industry.

All workers – current, new and potential – need to have opportunities to acquire the high level of skills they will need to succeed in the future. As a result, the industry needs a streamlined approach to identifying skills and developing training and certification to ensure the productivity and sustainability of the sector. The findings from the research suggest that in order to do this FPHRC undertake the development of a Competency-based NOS framework that encompasses broader industry subsectors and functional areas. This will allow for a multi-dimensional competency matrix that can leverage sector-wide and cross-sector commonalities and identify sector specific needs.

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Appendix 1:
Survey Demographics

Table 1: Province of Residence		
	Percentage of Respondents	Count
Alberta	7%	20
British Columbia	16%	44
Manitoba	7%	19
New Brunswick	4%	10
Newfoundland and Labrador	12%	32
Nova Scotia	11%	30
Ontario	17%	48
Prince Edward Island	4%	10
Quebec	13%	37
Saskatchewan	10%	27
Yukon	0%	1
Total Responses	100%	278

Table 2: Number of Employees in Organization		
	Percentage of Respondents	Count
1 – 4	19%	50
5 – 99	44%	118
100 - 499	26%	70
More than 500	11%	28
Total Responses	100%	266

Appendix 2:
Summary Results Occupational Needs Assessment

Industry	Sector-wide Skills Areas in Demand	Occupations in Demand by Employer	Priority	Emerging Occupations	Current Skills Gaps	Challenges to Hiring	Skills Common and Crucial to All Workers
General	Supervisors	Sanitation Workers Production Workers	High High	Electro-Mechanics	Quality control	Poor working conditions Lack of people Low pay	Essential Skills Health and Safety
Meat Production	Technical skills Mechanical aptitude Computer skills	Electricians Millwright Machine Operators QA Technicians R&D Sanitation Workers	Essential High High High High	Machine Operators Middle Management Maintenance Workers with electronic/ computer skills	HAACP knowledge Good manu-facturing processes	Lack of people Lack of skills Low pay Poor working conditions	Food Safety Health and safety Essential skills
Beverage Manufac-turing	Workers with specialized training Skilled workers	Jobs requiring advanced training and specialized training Managers Supervisors	High Essential Essential	Expertise in food sourcing	ES Literacy Customer service Food trans-formation Sanitation Technical Manu-facturing Leadership skills (for managers)	Lack of education Lack of on-the-job training	Attention to detail Food safety Health and Safety Communica-tion skills Inter-personal skills
Bakeries & Tortilla	General labourers Post-secondary educated professionals Workers with specialized training	Packaging Semi-Skilled (General Labourers)	Essential High Essential	Machine Operators	Production	Shift work Lack of people	Standards and regulation (WHMIS) Health and Safety Good manu-facturing practices

Industry	Sector-wide Skills Areas in Demand	Occupations in Demand by Employer	Priority	Emerging Occupations	Current Skills Gaps	Challenges to Hiring	Skills Common and Crucial to All Workers
Seafood	Skilled workers	Production Workers Skilled Workers (Mechanics, Electricians, Engineers) Supply Chain Managers	Essential High	Middle Management Supply Chain Management, Quality Assurance High-level Supervisors	Critical thinking	Lack of skills Lack of on-the-job training Low pay Lack of people	Communi-cation Literacy Health and Safety
Fruit and Vegetable	General labourers	Packaging Line Workers Quality control	Essential	Maintenance people with technical skills Food Safety Specialists	Job specific skills (industry knowledge)	Low pay	Food Safety Teamwork Health and safety
Other	Skilled workers General labourers	Machine Operators Skilled Labourers Sanitation Workers Entry level Production Workers	Essential High Essential Essential	Machine Operations Expertise in food safety standards and facility accreditation	Job specific skills Industry knowledge	Lack of skills Low pay Poor working conditions Shift work	Good manu-facturing practices Food safety Essential skills

Appendix 3:
Review of Current NOS/ Profile Methodologies

A national and international review was conducted in order to determine the viability of various existing NOS/Profile methodologies from other sector/jurisdictions as the foundation for developing an NOS framework for the food and beverage processing sector. This review examined existing NOS frameworks and methodologies from National and International industry sectors and specific manufacturing industry sectors.

Industry sectors and regional frameworks examined in this review included: FPHRC, Seafood Sector Council, Canadian Printing Industry Sector Council, Canadian Supply Chain Sector Council, Canadian Plastics Sector Council, Wood Manufacturing Council, Canadian Tourism Human Resource Council, UK Food and Drink Skills Council and Regional Model Competency Standards for Asia and the Pacific.

These methodologies and frameworks were chosen as comparative models due to the commonality of trends and needs in human resources, labour market, technological developments and the use of supply chain management within manufacturing. The results
of this review helped to guide the conclusions and recommendations outlined in the previous sections.

Canadian Printing Industries Sector Council (CPISC)

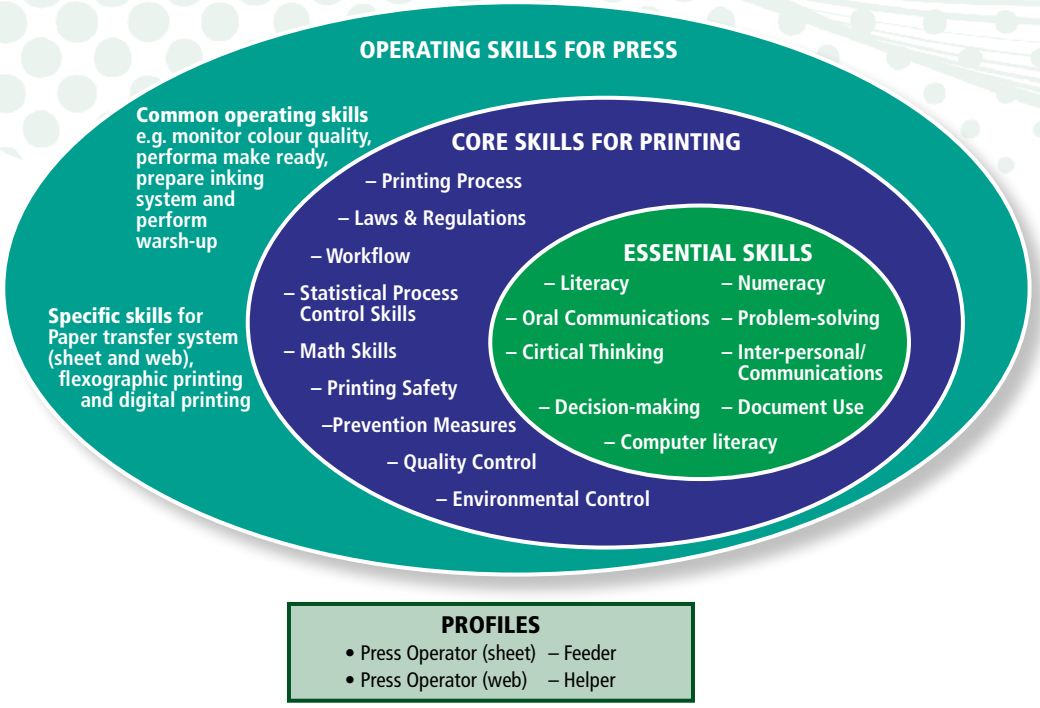
CPISC is currently using a competency NOS framework and methodology that reflects all aspects of the industry in an integrated manner and that mirrors the way the industry is organized and functions. For each process area, CPISC is developing three types of skill standards:

1. **Essential skills** are basic or "essential" to all occupations. They include literacy, numeracy, oral communication, problem solving, critical thinking, decision-making and inter-personal skills. The essential skills will generally be consistent for all process areas.

2. **Core skills** cover those elements that comprise a broad-based knowledge of the industry. For the most part, some core skills will cut across process areas, although some may be more relevant to a particular process area. For example, core skills could cover workflow knowledge, printing knowledge, statistical process control skills, measurement skills, printing safety, prevention measures and quality control.

3. **Operating skills** relate to specific operating functions within a process area. A function is defined as a set of related work activities organized in either chronological or operational order that often cut across occupations. In other words, functions are not highly specific job tasks but groups of related activities that often cut across job titles. For the press process area, for example, operating skills could include preparing ink and inking systems, preparing cylinders, monitoring colour quality and performing wash-up, as well as operating skills pertaining to a particular type of printing such as sheet fed, web, flexographic or digital.

Skill Standards for Press Process Area



Core and essential skills will be developed first and applied to the sector as a whole. Core and essential skills are included in the skill standards for a particular area, i.e. pre-press, press, finishing and bindery and production support. The development of essential, core and operating skills provide a solid foundation for the development of profiles of key occupations within each process area. Occupation is a generic term corresponding to a group of work activities involving a homogeneous set of knowledge and competencies.

The essential skills and core skills were established first. Based on research, existing resources and input from a working group of industry stakeholders, CPISC identified the 14 skills that are fundamental to all printing jobs. Next, operating skill standards were developed for each distinct printing process area—prepress, press, finishing and bindery. CPISC called upon employees who specialize in each of these processes to isolate occupation specific skill sets.

Finally, CPISC asked industry members across the country to validate the completed basic, core and operating skill standards. Shared through focus groups and online questionnaires, the members' comments and suggestions helped refine the skill standards and informed the profiles of key occupations.

Who are the skills standards and profiles for?

- Employers
- Current workers
- Learners
- Education and Training Providers

How will they be used?

- **Current workers:** to provide a portable credential, allowing them to change employers and even provinces to find work for which they are qualified. They will also be useful for assessing current knowledge and skills and for seeking further training as needed to improve them.

- **Employers:** agreed-upon skill standards will serve as a reliable gauge of potential employees' proficiency and to assess and modify their own in-house training. As well, skill standards can be used to develop individual employee development plans and can help businesses to develop and refine cross-firm training.

- **Potential employees:** to learn about available career pathways and to determine if printing and graphic communications is a sector that matches their personal goals and skill areas.

- **Education and training providers:** to provide important information about the direction in which the industry is headed. The skill standards will become the basis for revising curriculum and developing new assessment tools and methods.

The development of skill standards and profiles will also provide a basis for exploring recognition and certification models for the printing and graphic communications industry.

Similarities between CPISC and FPHRC

CPISC, like the FPHRC and many manufacturing sectors has production processes that are highly integrated and vary widely in size of company, types of operating equipment, range of job titles and production output. Similar to other Canadian sector councils and international food manufacturing sector councils and associations, they have chosen to develop occupational standards that focus on functional areas and roles within manufacturing and production processes. Traditional standards are often based on individual occupations. CPISC chose to look first for commonalities across production areas such as Essential skills and Core skills which are embedded into standards created for key occupations within the three distinct production areas that comprise the printing process: pre-press, press and finishing and bindery. This allows for a more efficient and streamlined approach to Occupational standard development.

Wood Manufacturing Council (WMC)

The Wood Manufacturing Council's mandate is to plan, develop and implement human resource strategies that support the long-term growth and competitiveness of Canada's advanced wood products manufacturing industry and meet the developmental needs of its workforce. The wood manufacturing sector produces high-strength products from smaller trees using supply chain management that includes an integration of operations from order entry to manufacturing, and then to distribution. A wide range of small and large businesses comprises the industry.

The industry is made up of five subsectors:

- Furniture
- Cabinets
- Window and doors
- Millwork
- Building components, including structural engineered products and factory-built housing

The Council identifies and examines the necessary skills and knowledge required to respond to changing industry needs. The Council also develops an overall strategic plan to address key issues such as the shortage of skilled workers and the need for national standards for worker competencies.

WMC Approach to NOS Development

In 2008, the WMC commissioned a report called the Skills and Technology Roadmap (STRM) for the Canadian Advanced Wood Processing Industry. The objective of the STRM was to identify a set of high priority technical projects that will assist the advanced wood processing industry to meet future market demands. It was also intended to provide the WMC with knowledge about technology and technology-related skills gaps within the industry.

The report identified that as plants further introduce lean manufacturing and data handling technologies, there will be a greater need for individuals who are able to work with the electrical and mechanical components of the manufacturing process. This includes a greater understanding of troubleshooting the electrical components of the machinery and understanding how it relates to the mechanical components. However, these individuals will still need to have a thorough understanding of the traditional wood manufacturing processes.

NOS Development Approach

The WMC first identified emerging trends for technology and accompanying skill requirements within the five subsectors of the advanced wood manufacturing sector. The Council then focused the development of occupational standards on the occupations with the greatest need for support related to technological change and workforce shortages. These are generally high-demand occupations and those with a current need for renewed training or skill.

The WMC is using a more traditional approach to NOS development. Some standards are built based on the progressive knowledge required by a particular occupation. It breaks the skills into three main areas: foundation skill, sector related skills and then occupational specific skills. Other occupational standards are developed with the identification of major skill blocks with skills and sub-skills.

Each occupational standard includes:

- Description of the Occupation
- List of job titles captured within the occupation
- Description of duties
- Skill Blocks, which may include: Communication Skills, Job Performance Skills, Processing and Technical Knowledge, Production Skills

Who are the Skills standards and profiles for?

- Employers
- Employees
- Educators

How will they be used?

- **Employers** will be able to focus recruitment efforts on the specific workers they need, and make better matches between employees and available positions. Employers can use NOS to:
  - recruit new employees
  - define industry and job requirements

- introduce certification programs
- establish succession plans
- develop interview guides

- **Employees** will be able to better prepare for and plan a career path, and identify which skills they need to upgrade, leading to greater job fulfillment and satisfaction. Employees can use NOS to:
  - upgrade skills
  - plan their career path

- **Educators** will have a clearer, consistent idea of training requirements. They'll be able to plan and develop programs that will better serve their students. Educators use NOS to:
  - develop school curriculum training programs

Similarities between WMC and FPHRC

The WMC NOS development approach is based on the progressive knowledge required by a worker within the wood manufacturing industry and is similar to the CPISC approach in that the required foundation skills, sector related skills and then occupational specific skills are identified. But unlike the CPISC, CSCSC, FPHRC and other manufacturing based industry sectors, there is no indication in the research of a breakdown of roles within the functional area of manufacturing. This difference can be attributed to the current need, identified in recent research for the Wood manufacturing industry in Canada, to develop a more Supply Chain management focused approach to remain competitive.

While the NOS structure of the WMC meets its current needs in identifying skills requirements for occupations within its industry it may have limited usefulness within the food and beverage processing sector that currently incorporates a supply chain management approach.

Plastics Sector Council

The Canadian Plastics Sector Council (CPSC) is a national not-for-profit association created to explore and address emerging human resource issues in the plastics processing industry.

The plastics industry is predominately populated by small and medium-size firms; over 85% of establishments in the plastics sector have fewer than 100 employees. The plastics sector workforce also has characteristics that make it unique to the overall Canadian labour market. The majority (51.2%) of plastics sector workers are between the ages of 25 and 44 years, there is also a high proportion of plastics workers who speak a non-official language as their mother tongue (33.5%), who do not have a high school diploma (22.6%), and who have no post-secondary training (57.0%).[30]

The plastics industry is technologically intensive. Efforts to increase economies of scale and reduce labour costs have prompted the introduction of increasingly technical and complex manufacturing processes. While certain technical and practical skills are necessary within the industry, the range and scope of skills required can vary widely between firms.

[30] Training Needs Analysis for the Canadian Plastics Sector Council : Final Report, 2011 http://www.cpsc-ccsp.ca/PDFS/CPSC%20TNA%20Report-Final-eng%20(July2011).pdf

Current research[31] indicated that given the national scope of the plastics industry and the specialized focus of individual firms, the CPSC needed to develop an appropriately broad-based training curriculum. Based on the development of key skills, the CPSC could work in conjunction with plastics trainers to create an occupation-focused curriculum.

CPSC Approach to NOS Development

Through research, the CPSC indentified key technical skills on which employers preferred training to be focused. These skills identified by employers have become the list of competencies (skills and knowledge) required to perform a specific function within identified plastics process areas. Additional non-technical skills identified included: Supervisory/Management, Sales/Marketing, and Logistics/Purchasing. Occupational Standards were developed by process area in which the skill block defines the technical skills required.

Process Areas

These are the plastics process areas identified by the Canadian Plastics Sector Council (CPSC) as the focus of occupational standards development. Process areas include:

- Injection Moulding
- Blow Moulding
- Extrusion
- Fabrication
- Thermoset
- Thermoforming
- Composites
- Rotational

Skill Blocks for Technical Skills

A combination of competencies (skills and knowledge) is required to perform a specific function within each process area. These competencies can include:

- Essential Skills
- Environmental
- Maintenance
- Material Handling
- Occupational Health and safety
- Personal Management Skills
- Product Process Knowledge
- Production Management
- Production Preparation
- Quality Control
- Work Practices

Similarities between CPSC and FPHRC

The CPSC is a manufacturing industry with similar human resource challenges as the FPHRC but their needs vary in some critical areas. While certain technical and practical skills are necessary within the industry, the range and scope of skills required can vary widely between firms, depending on the process area. This is reflected in the NOS structure

[31] Training Needs Analysis for the Canadian Plastics Sector Council : Final Report, 2011 http://www.cpsc-ccsp.ca/PDFS/CPSC%20TNA%20Report-Final-eng%20(July2011).pdf

adopted by CPSC. Within the FPHRC sector, this situation is somewhat different in that the supply chain process and common functional areas remain relatively similar within the ten subsectors.

Supply Chain Sector Council (CSCSC)

Supply chain management integrates supply and demand management within and across companies. It includes all of the logistics management activities involved in sourcing and procurement, conversion, and management activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers.[32]

"Supply Chain" encompasses the following three functions:
i. Supply of materials to a manufacturer;
ii. Manufacturing process; and,
iii. Distribution of finished goods through a network of distributors and retailers to a final customer.

Companies involved in various stages of this process are linked to each other through a supply chain.

A labour-market update for CSCSC was completed in May 2011. Sector highlights include the following:[33]

- As of 2010, there were approximately 767,200 workers, from a range of occupations and industries, in the supply chain sector labour force within Canada (excluding truck drivers).
- The annual labour force growth rate of the supply chain sector was 2.23% from 2001 to 2010.
- The sector added about 15,300 new jobs per year between 2001 and 2010. The sector will continue to face a demand for jobs of more than 80,000 jobs a year due to retirements and turnover.
- Interview and survey results from industry participants indicate the following to be the main human resource issues facing the supply chain sector:
  - Attraction
  - Education and training
  - Keeping pace with technology
  - Succession and career planning
- Employees identified the following skills that they feel they require much more of either now or in the next five years in order to be successful in their jobs:
  - Financial planning
  - Forecasting
  - Cost analysis
  - Knowledge of international business practices
  - Knowledge of laws and regulations
  - Knowledge of logistics functions and the supply chain
  - Mechanical skills
  - Optimization of workflow
  - Knowledge of transportation
  - General management and business
  - Languages

[32] Training Needs Analysis for the Canadian Plastics Sector Council : Final Report, 2011 http://www.cpsc-ccsp.ca/PDFS/CPSC%20TNA%20Report-Final-eng%20(July2011).pdf

[33] Canadian Supply Chain Sector Council, Supply Chain Sector Council Facts and Figures, n.d., http://www.supplychaincanada.org/assets/u/SectorFactsandFiguresEnglish.pdf

CSCSC Approach to NOS Development

The need for national occupational standards was reflected in recommendations of a 2005 study that touched all aspects of the supply chain—from employers, organized labour and learning-system providers to career seekers and those already employed in the sector. The report indicated that development of a skilled and knowledge-based workforce—and a related need for employees with the suitable skills and competencies was a priority across the sector[34].

According to sector representatives, the CSCSC's chose an innovative approach to standards development citing that "the traditional path to developing standards is very time-consuming on the part of the developer and on the part of the participants, and can be very expensive." The CSCSC fast-tracked the process through a best practices approach. The CSCSC first looked to stakeholders to prioritize its work, identifying seven functional areas and 26 occupations of the sector, and focusing first on occupations with the greatest need for support related to job descriptions, competency profiles and job-performance tools to help address workforce shortages. These are generally high-demand occupations and those with a current need for renewed training or skill.[35] The first phase of the project, completed in 2009, led to 15 national occupational standards.

Specific Functional Areas Identified within the Supply Chain

Through research, CSCSC identified seven sub-functional areas, which are then broken down by occupational categories of managerial and tactical. The 7 functional areas include:

- Senior Management
- Logistics Information Systems
- Warehousing
- Transportation
- Inventory/Material Control
- Purchasing
- Marketing and Sales

Each occupational standard includes:

- Position title
- Position description
- Position development
- Required qualifications in terms of education, training and related work experience
- List of tasks in the role
- List of tools and technologies used on the job
- Catalogue of the knowledge, skills and personal attributes needed to succeed in the position
- Link to an essential-skills profile
- List of alternative position titles (with corresponding NOC codes) captured within the position title

[34] National Occupational Standards for the Supply Chain: A framework for best practices, http://www.supplychaincanada.org/assets/u/CSCSCarticleNOS2010.pdf

[35] See Career in Supply Chain Chart, Appendix 6

Who are the skills standards and profiles for?

- Employers
- Employees
- Education and Training Providers

How will they be used?

- **Employers:** in developing job descriptions, targeting recruitment and selection efforts, creating benchmarks for evaluating employee performance, and planning education and training for employees
- **Employees:** in identifying skills and knowledge needed for particular occupations, assessing their abilities and training needs, and identifying clear career paths
- **Educators and trainers:** in understanding employers' needs, and designing training and educational programs to meet them

Similarities between CSCSC and FPHRC

CSCSC works across many industries with highly integrated functional areas. They have focused the development of the Occupational Standards within these functional areas. This methodology works well to capture common core and specific skills within the functional areas. The breakdown of the occupations within the supply chain functional areas are applicable to the food and beverage processing sector but need to be further broken down to take into account the manufacturing and processing unique to that sector.

Improve Food and Drink Sector Skills Council

Improve provides the strategic overview for the food & drink manufacturing and processing (FDMP) sector to help increase performance and productivity. It was established as a Sector Skills Council for Food and Drink Manufacturing in 2004. Recent research conducted by Improve indicated that the UK FDMP industry was facing a number of skills issues. While recruitment is perceived as less difficult by employers it was reported that hard to fill vacancies were most common amongst skilled trade occupations and process, plant and machine operatives. FDMP employers reported the highest level of skills gaps was amongst managers, skilled trades and process, plant and machine operative roles. The report also indicated that the projected transition to a more highly skilled FDMP workforce would have a significant impact on skills requirements within the industry. "The National Training Agency has developed this same process of functional analysis which is widely accepted internationally as a superior method of standard development. The principal methodology used is disaggregation, which involves the classification of the occupational area by the separation of functions. The outcome of this process is an occupational and functional map. Each National Occupational Standard begins with a definition of the occupational area and a description of the nature of the work. The key role of the worker is then explained in the context of the industry or sector."[36]

Improve's Approach to NOS Development

Because of this research, Improve set about developing new sets of standards and qualifications to help employers drive the development of skills and knowledge required in industry job roles. One of Improve's first tasks was to identify the job roles and functions that existed within the industry to provide insight and a context for the occupations. The result of the research was the creation of an occupational map used in conjunction with a functional map, both of which cover many subsectors of the industry. These two maps inform the development of NOSs.

[36] United Nations Educational, Scientific, and Cultural Organization (UNESCO), http://www.unesco.org/new/en/unesco/

The occupational map breaks down job roles within four functional areas: Business and People; Technical; Supply Chain and Production. Each functional area is broken down into occupational areas in which a list of relevant job roles and contextualized information is provided. The functional map consists of a functional analysis for each of the occupational areas to determine the different types of skills and knowledge required to be competent in these roles. It covers both the process knowledge as well as any relevant technical and scientific knowledge. The two maps have been designed to show the link between occupations, functions, NOSs and qualifications.[37] "This has been done to ease the process of identifying the skills and knowledge needs of the food and drink workforce for employers and learning providers".

Occupational Map Format

The list below describes the four functional areas and the corresponding job roles identified in the Occupational Map. Within the Occupational Map each of the Functional areas includes a description of the roles found within that functional area and relevant legislation, policy guidelines.

1. Business & People:
- HR
- Finance
- Business Strategy

2. Technical
- Quality & Improvement
- Food Safety
- Food Science

3. Supply Chain
- Packaging
- Wholesale
- Livestock Markets
- Transport

4. Production
- Meat and Poultry
- Bakery
- Seafood
- Brewing
- Sweet Confectionery

Functional Map Format

The purpose of the functional map is to map the occupational functions to NOSs by showing the key functions of an occupational area. The functional map contains: Key Roles, Principal Functions; Functions; Standards and Titles.

Key Role Area (identified as A, B, C, etc.): This gives the reader the sector area and the role associated with that area. For example: Produce food and drink products.

[37] The full occupation and functional map can be found at: http://improveltd.co.uk/england/occupational-and-functional-maps-england

Principle functions (identified as A1, B1, etc.): This gives the reader the Principle functions of that area. For example: Manufacture and process food and drink products.

A. Lead and manage the business

A1 Provide direction to the business
A2 Manage self and others
A3 Manage resources
A4 Increase business

B. Provide technical, engineering and product development services

B1 Ensure quality and improvement
B2 Ensure food safety
B3 Ensure health & safety
B4 Control environmental impact, etc.

C. Manage the supply chain within food and drink processing operations

C1 Purchase goods and equipment
C2 Monitor and control the supply of goods

D. Produce food and drink products

D1 Manage food and drink operations
D2 Manufacture and process food and drink products
D3 Manufacture and production support

Functions (identified as D2.1, etc): Each area is then split further into functions of the principal function area. For example, D: Produce food and drink products, D2: Manufacture and process food and drink, D2.2 Control automated production operations and D1.4 Develop and maintain production schedules, etc. Listed below are additional examples of key roles, principal functions and specific functions of that area.

D: Produce food and drink products

D2: Manufacture and process food and drink

- D2.1 Perform technical production operations
- D2.2 Control automated production operations
- D2.3 Perform bakery operations
- D2.4 Perform meat & poultry operations
- D2.5 Perform fish and shellfish processing operations
- D2.6 Perform pilling & cereals processing operations
- D2.7 Perform sweet confectionery processing operations
- D2.8 Perform dairy processing operations
- D2.10 Perform wine making operations
- D2.11 Perform fresh produce operations
- D2.9 Perform brewing operations

Who are the Skills standards and profiles for?

- Employers
- Employees
- Education and Training Providers

How will the NOSs be used?

- **Employees:** for professional development and increase job satisfaction.
- **Employers:** to increase business productivity, for selection and recruitment, staff development and training, benchmarking and to inform the development of in-house training programs and training specifications used by employers.
- **Education and training providers:** to form the basis of qualifications and apprenticeship content, with industry agreed descriptions of expected competences into vocational qualifications and other formal training programs. Inform the content for Improve Proficiency Qualifications (IPQ's) a suite of work based qualifications developed specifically for the food and drink industry.

Similarities between FDMSC and FPHRC

The FDMSC like the FPHRC is made up of many subsectors and functional areas. Activities across both the sectors range widely from the acquisition of raw material to bottling/packaging/canning and both have a similar supply chain process. Many of the functional areas may overlap within a food and beverage processing organization. Both the FDMSC and the FPHRC are experiencing the same trends and drivers, which will require the up skilling and multi-skilling of production staff. Both are facing the need to develop an NOS/Profile framework designed for the broader industry, industry subsector or occupational cluster coverage. A process for mapping occupations across the industry and creating functional maps that link skill and knowledge requirements to functional areas and the occupational areas within them will enable employers and learning providers to utilize NOSs for the current and upcoming human resource and training needs.

International Labour Organization (ILO)

The ILO is the international organization responsible for drawing up and overseeing international labour standards. It is the only 'tripartite' United Nations agency that brings together representatives of governments, employers and workers to jointly shape policies and programs promoting "decent work" for all.[38]

The need for skills recognition, and the development of national skills standards, was required in Asia and the Pacific. Changes to technology, the need for competiveness, the requirement to improve the quality and effectiveness of training systems and the increasing mobility of skilled workers were the driving forces behind the development of new approaches to skills recognition together with new skills and standards. As a result, the International Labour Office for Asia and Pacific developed regional model competency standards (RMCS) for Asia and the Pacific. Similar competency models for Occupational Standards have been used with success in various European Countries.

ILO Approach to NOS development[39]

Research conducted by the ILO indicated that there was a move away from occupational standards towards industry-based competency standards. Specifically, traditional occupational skill standards methodologies where

[38] International Labour Organization Homepage http://www.ilo.org/global/about-the-ilo/lang--en/index.htm

[39] Guidelines for Development of Regional Model Competency Standards (RMCS), International Labour Organization (ILO), 2006, http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_bk_pb_234_en.pdf

traditional occupations were used as a basis for clustering competencies was no longer a viable option as they were cumbersome to develop and did not meet the needs of the subsectors and functional areas within industries. New competency-based model standards were being designed and used within many countries to encompass broader industry, industry subsector or occupational cluster coverage. This type of standard better reflected the complex and diverse structure of businesses within industries. Additionally, industry-based standards had wider applications, were quicker to develop and had greater support and uptake within industries. As a result, the ILO developed RMCS which are sets of competency standards in streams of occupational or industry sector groupings.

The RMCS concept deals with a whole industry or major industry sectors, as opposed to single occupations. It allows for the recognition of occupations, including traditional trades. At the same time, it means the functions and skills to work effectively in an industry or discrete industry sector can be described in a common, competency based format. According to the RCMS spokesperson, "Many countries that use competency standards across their training system have found that whole qualifications are not always the best way to aggregate competencies. Increasingly, smaller sets of skills make up highly valued job roles and assist individual workers not wanting or needing lengthy 'trade' style qualifications."

The RMCS format is designed to allow various combinations of work functions to be put together to describe whole jobs. This approach can also show combinations of competencies that are the equivalent of existing trade or other occupations. As such, the standards can accommodate industry job requirements and cross-industry or trade requirements from within the same framework of descriptors.

The RCMS spokesperson added, "In today's faster paced world of work even existing workers with respected qualifications still need to upgrade frequently to keep abreast of new technologies and workplace practices. They need to access short, sharp training programs that put together valuable new competencies that complement each other. There are also many new portfolio workers who undertake a variety of jobs across various occupational sectors according to demand."

How Are Competencies Defined within the RMSC METHODOLOGY?

Competencies describe what people in, or entering work need to be able to do. This requires a standard that enables industry to accurately define its workplace requirements – these are called competency (not 'skill') standards. The description of competency must therefore capture the way effective workers operate – not just list their duties. Therefore, competencies need to encompass the following requirements:

- Efficiently perform individual tasks (task skills)
- Manage a number of different tasks within a job (task management skills)
- Effectively respond to irregularities and breakdowns in routine (contingency management skills)
- Deal with the responsibilities and expectations of the work environment (job/role environment skills), including working with others and in teams[40]

RMCS framework provides industries and subsectors with a matrix of required competencies, including how used and in what combination within a functional area, organization, and occupation and qualification structure.

[40] Guidelines for Development of Regional Model Competency Standards (RMCS), International Labour Organization (ILO), 2006, http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_bk_pb_234_en.pdf

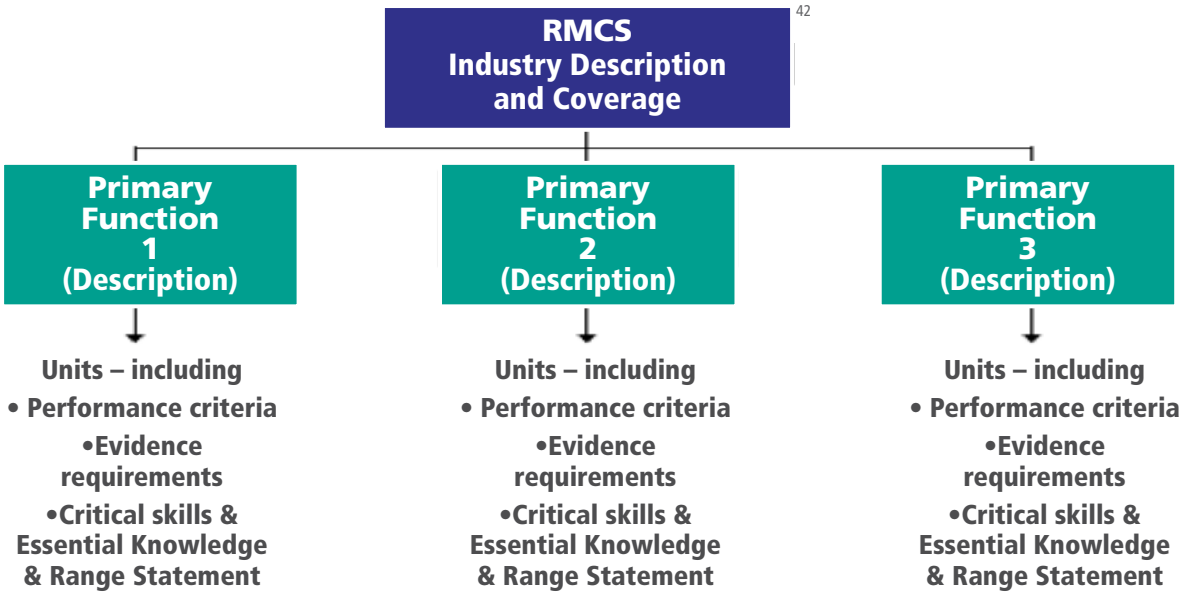
The Structure of RMCS (NOS)

Regional Model Competency Standards have the following three primary components:[41]

1. Industry Descriptor and Coverage
2. Primary Functions
3. Units (units – are structured with four sub-components):
   - Performance Criteria
   - Evidence requirements
   - Critical Skills and Essential Knowledge
   - Range Statement

RMCS Format

Each RMCS has an Industry Descriptor and Coverage statement and outlines the major Functions. The diagram below describes the format and the relationship between the components. The Primary Functions would be shown as illustrated and the detailed Units would follow in the RMCS in the same order as the Functions.



[42]

RMCS can cover a whole industry in this broad, functional structure and not by identifying discrete occupations or job roles. The RMCS accommodates different primary functions and occupational areas by using multiple combinations of the units in the model standards to suit any local occupational outcome.

[41] Guidelines for Development of Regional Model Competency Standards (RMCS), International Labour Organization (ILO), 2006, http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_bk_pb_234_en.pdf

[42] Guidelines for Development of Regional Model Competency Standards (RMCS), International Labour Organization (ILO), 2006, http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_bk_pb_234_en.pdf

Who are the Skills standards and profiles for?

- Employers
- Employees
- Education and Training Providers

How will they be used?

The standards are useful tools for:

- describing competencies for functional areas and job roles
- determining qualifications
- describing new jobs for any industry
- designing vocational training or testing materials for all work, including trades
- conducting skills audits at the enterprise or national level i.e. for assessing the skills of migrant workers
- restructuring an enterprise or industry sector for development of new services and manufactures
- planning for multi-skilling of a workforce
- introduction of team based approaches to work

Similarities between RMCS and FPHRC

An industry-based competency standard model such as the RMCS has the flexibility to be used for broad based industry, industry subsectors and functional areas. It is a methodology that is streamlined in its approach and supports an industry with rapidly changing technologies and a need to ensure skills development, knowledge transfer and professional development for new and existing employees.

Appendix 4:
Proposed Food and Beverage Sector Blueprint

Occupations that have similar skill requirements are grouped within functional areas for standards development. Developing these skills into standards will allow them to be transferred across multiple occupations within that functional area.

The skills in red identify core or common skills across all the functional areas. The skills in blue identify skills that are common across some functional areas, but not all. The skills in black are unique to that functional area.

Functional Areas	Occupations	Important Skills
Management	Sr. Management (President, CEO, GM, VP, Director) Plant Managers	Communication Skills Workplace Safety Food Safety General Knowledge of Food Processing Industry Food Processing Regulations Audit Awareness Leadership Skills Public Relations Business Planning Competitive Information/Markets Decision Making/Problem Solving Overview of all Elements of the Food/Beverage Processing Industry
Business, Finance and Administration	HR Sales and Marketing IT Finance Clerical Customer Service	Communication Skills Workplace Safety Food Safety General Knowledge of Food Processing
Technical / Machine Operation	Precision Workers (machinists, electricians, maintenance workers)	Communication Skills Workplace Safety Food Safety Mechanical Skills Machine Operation
Facility Operations and Maintenance	Professionals/Engineers Technicians/Technologists Cleaners and Sanitation Staff	Communication Skills Workplace Safety Food Safety Mechanical Skills Specialized Sanitation Skills

Functional Areas	Occupations	Important Skills
Quality Control	Quality and Improvement Food Safety	Communication Skills Workplace Safety Food Safety Audit Awareness Quality Control ISO Standards
Supervisors	Foremen/Women Coordinators/Schedulers	Communication Skills Workplace Safety Food Safety General Knowledge of Food Processing Industry Food Handling Good Manufacturing Practices Audit Awareness Leadership Skills Food Processing Regulations Computer Skills Problem Solving Statistical Process Control
Production	Skilled workers and operators (butchers, meat cutters, bakers, blenders) Semi-skilled Workers (production workers, line workers, general labour, packaging)	Communication Skills Food Safety Workplace Safety Food Handling Good Manufacturing Practices
Inputs and Outputs	Shipping and Handling Personnel Purchasing Procurement	Communication Skills Food Safety Workplace Safety Traceability Computerization Packaging Transportation Stock Rotation Warehouse and Shipping Raw Material Analysis/Awareness
R&D	Food Scientists Researchers Product Developers	Communication Skills Food Safety Workplace Safety Food Handling

NOTES

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