

SELF-REGULATION AND CORPORATE SUSTAINABILITY IN THE BREWING INDUSTRY: A
PROPOSAL FOR SUSTAINABILITY CERTIFICATION FOR SMALL BREWERS IN ONTARIO

By

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Author's Declaration

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Self-regulation and corporate sustainability in the brewing industry: a proposal for
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Master of Applied Science, 2018

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Environmental Applied Science and Management

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Abstract

Recent growth within the craft brewing industry has increased employment and economic growth in Ontario, and has also raised social and environmental concerns. The purpose of this thesis was to explore the application of a self-regulatory model within the Ontario craft brewing industry to improve sustainability performance. Based on a literature review, two content analyses, interviews with craft breweries, and interviews with sustainability certification administrators, the viability, content, and organization of a self-regulatory model has been considered. Findings suggest that a sustainability certification scheme grounded in a public report may be a viable governance mechanism for craft breweries in Ontario to adopt, and may result in improved sustainability performance within firms. A proposal for a guideline, requirements, and a list of indicators for a sustainability certification scheme is presented.

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1.0 Introduction

Since industrialization in the 18th century, the impact from mankind on the environment has rapidly accelerated (Crutzen, 2002). Extreme population growth coupled with harmful environmental effects caused from human activity have been so notable they have given rise to a new geological time period being referred to as the Anthropocene (Crutzen, 2002). The Anthropocene credits human actions as the largest driver affecting environmental changes on a global scale (Steffen, Crutzen, & McNeill, 2007; Steffen et al., 2015a). The concept of planetary boundaries presented by Rockstrom (2009) establishes a science-based guide to defining the limits of several Earth systems that are impacted by human actions. Planetary boundaries have been suggested to guide future development (Steffen et al., 2015b).

Planetary boundaries have a profound impact on the globalized approach to managing anthropogenic environmental impacts, and point to the collective necessity to take environmental management seriously in a globalized world (Whiteman, Walker, & Perego, 2013). The Great Acceleration illustrates the unsettling trend that left unchanged, human development may push planetary boundaries outside of a safe operating space. The current globalized economy retains globalized organizations that operate in many different nation states with differing regulatory demands. Implementing new governance mechanisms is an important step to combat barriers caused by globalization (Dernbach, 2003; Jordan et al., 2005; Mena & Palazzo, 2012). Since the mid-20th century organizations have adopted self-regulatory models as a response to public concern for various social and

environmental impacts (Geioseffi, 2004; Saari, 1999; Walsh & Pyrich, 1995). Many voluntary codes and standards have emerged within multiple industries with the goal of addressing sustainable development within individual firms, and across industries (Helms & Webb, 2014; Kolk, van Tulder, & Welters, 1999; Reinecke et al., 2013). Industry-specific sustainability certification schemes have emerged as a promising self-regulatory mechanism to encourage sustainable development on a global scale (Christmann & Taylor, 2006).

There are significant social and environmental concerns originating from the brewing industry that add to the global impact on earth systems, and on the people involved. The number of unique small breweries with operations in Ontario has grown to 283 by the end of 2016 (Ontario Ministry of Finance, 2017). There were only 90 breweries of all sizes in Ontario in 2012 (Beer Canada, 2017). The Ontario craft brewing industry is in the midst of a rapid growth phase, and is adequately poised to consider a new self-regulatory model to address social and environmental concerns.

It is important to consider existing social and environmental impacts within the brewing industry. Tokos et al. (2012), and Olajire (2012) identify the main environmental and social impacts associated with beer production within the production facility. Significant aspect categories identified by both Tokos et al. (2012) and Olajire (2012) include the following: water, energy, solid waste, wastewater effluent, greenhouse gas emissions, local communities, and employees. Refer to Appendix 1 for a more robust list of specific sustainability indicators.

Lifecycle impacts within the brewing industry are very significant. Hospido et al., (2005) and Amienyo and Azapagic (2016) identify environmental impacts throughout primary production, transportation, production, distribution, and consumer use phases of beer production. The environmental impacts associated with raw material inputs and packaging elements were found to cause the largest environmental impacts compared with all other categories (Hospido et al., 2005; Talve, 2001). To produce one liter of beer, Amienyo and Azapagic (2016) conclude that 41.2-41.8 liters of water, 10.3-17.5 MJ of primary energy, and 510-842 g of CO₂-e emissions are required throughout the lifecycle.

Based on data published by Beer Canada (2017), Ontario Craft Brewers (2017d), and Olajire (2012) Ontario craft breweries are responsible for up to an estimated 4.2 million hectoliters of water, 57.8 million MJ of energy, 7.3 million kg of CO₂-e emissions, 2 million kg of solid waste, and 3.7 million hectoliters of wastewater emissions within 2016 occurring within production processes alone. In 2016, the operations of Ontario craft breweries impacted 110 different communities, and 1,500 employees (Ontario Craft Brewers, 2017d).

The craft brewing industry in Ontario is responsible for significant environmental and social impacts. There are also barriers or challenges faced by craft breweries in Ontario to improve environmental and social impacts. Two significant challenges have emerged within this thesis. A lack of financial resources, and a lack of knowledge have emerged as the two leading challenges faced by Ontario craft breweries to improve sustainability performance.

The composition of a self-regulatory governance model is addressed within this thesis. A certification scheme grounded in the production of a public report, rather than substantive requirements, is proposed as a means to improve sustainability performance, overcome significant challenges, and ultimately address development in a sustainable manner.

1.1 Composition of Introduction

This chapter provides an introduction to the topic of research. The chapter will present the purpose of this study, and the thesis question guiding research regarding the topic of self-regulation in Ontario's craft brewing industry. The objectives of research will be defined. This chapter will present the organization of this thesis regarding each subsequent chapter, and the topics within each chapter. Finally, research motivations will be succinctly outlined.

1.2 Purpose and Thesis Question

The purpose of this study is to explore sustainability certification as a potential self-regulatory mechanism for application in the craft brewing industry in Ontario to address environmental and social impacts. Research will be directed by the following thesis question: what is a viable model for a self-regulatory sustainability certification scheme for Ontario-based small brewers? Underlying the thesis, and research will be the goal of producing a self-regulatory model accessible for small-brewers in Ontario that will focus on environmental, and social performance improvement.

1.3 Research Intention and Objectives

The body of literature concerning the benefits, and evaluating the effectiveness of corporate sustainability (CS) certification, codes, and standards is robust (Blackman & Rivera, 2011; Mori et al., 2016). Research is starting to be directed towards industry-specific CS certification, such as in the seafood industry (Kvalvik, Noestvold & Young, 2014; Madin & Macreadie, 2015), and the tea industry (Vermeulen & Dengerink, 2016). This thesis will add to academic literature by providing a proposal for a CS certification scheme specific to the craft brewing industry in Ontario.

The following three objectives will be pursued within this thesis:

- 1) Compile and synthesize relevant information regarding self-regulation, and the craft brewing industry.
- 2) Identify relevant emerging information from literature review, content analysis, and interviews that may be used to determine the appropriate content, composition, and structure for a sustainability certification scheme proposal for Ontario-based craft brewers.
- 3) Develop a proposal for an industry-specific sustainability certification scheme for Ontario craft breweries that includes guidelines, and a preliminary list of sustainability indicators.

Before proposing CS certification as a solution to improve CS performance, it must be determined that a CS certification scheme may be viable to provide CS performance improvement. The factors influencing CS performance improvement, and control

mechanisms that may be included within the proposed certification will be researched within a literature review. The methods that may guide performance assessment will be researched, including the identification of potentially relevant sustainability indicators.

1.4 Thesis Organization

The first chapter of this thesis is the current chapter that includes an introduction, the purpose of research and the guiding thesis question, research intentions and objectives, the organization of the written thesis, and a statement regarding the motivation of the thesis. The first chapter provides a solid introduction to the topic of concern within the thesis, and outlines how research will be approached.

The second chapter will discuss the methodology employed for this research study. The purpose and objectives will be further discussed with more detail. The research methods will be identified and defined. The research process will be communicated in detail. Limitations will be identified and discussed.

Research will be grounded in the literature review provided within the third chapter. There will be a review of regulation that will define relevant concepts, and clarify existing benefits and challenges. Self-regulatory concepts include Corporate Social Responsibility (CSR), Corporate Sustainability (CS), enterprise sustainability, Environmental Management Systems (EMSs), certification schemes, CS performance and assessment, and CS as it related to Small and Medium sized Enterprises (SMEs). The third chapter offers definitions of relevant concepts, and provides significant context for the remaining chapters.

The fourth chapter will review the emergence of the craft brewing industry, and the relevant operational components. The historical context of the craft brewing industry is clarified within this chapter and offers context for the current interest in self-regulation. The current state of the Ontario craft brewing industry is discussed. Operational components including processes and the relevant inputs used within craft breweries are reviewed to provide an understanding of relevant behaviours that may influence CS performance. Sustainability impacts, and best practices regarding sustainability management in the craft brewing industry will be considered.

The fifth chapter will present two simple content analyses that were performed. The first quantitative content analysis will be introduced, and findings will be presented. The second qualitative content analysis will be introduced, and finding will be analysed and discussed.

The sixth chapter offers a short description of theory. Resource based theory of the firm is discussed. Chapter six also presents a conceptual framework.

The focus of the seventh chapter will present results from interviews undertaken with four firms operating within the craft brewing industry in Ontario, and four organizations that administer certification schemes. Specific topics will be identified that have emerged through the interviews, and will be discussed in relation to topics within the literature review and content analyses. Topics will also be discussed as they may relate to the proposed certification scheme.

The eighth chapter will introduce the elements proposed within the suggested certification scheme. Findings and results from research will be contextualized and synthesized to substantiate proposed elements within the certification guidelines and the proposed list of sustainability indicators. The proposal for certification will cover the guidelines and requirements for certification. Guidelines and requirements outline the specifics proposed for CS certification including required declarations, optional indicator declarations, and performance assessment.

The thesis will finalize with future research recommendations, and a conclusion within the eighth chapter. The objectives of the study will be discussed. Suggestions will be made for future research that may help further academic knowledge on the topics of self-regulation, and CS certification in the craft brewing industry. A conclusion to the research presented within this thesis will finalize the report.

1.5 Motivation

Environmental and social impacts are challenging to manage, and improve within the craft brewing industry in Ontario. Recent industry growth in Ontario with respect to the number of operating craft breweries points to a growing need to address the rising impacts associated with development in a sustainable manner. Research is motivated by the interest to help support development within the craft brewing industry in Ontario in a fashion that will be economically, socially, and environmentally sustainable.

2.0 Theory and Conceptual Framework

To address social and environmental impacts within the Ontario craft brewing industry it is helpful to examine relevant existing theory. This chapter identifies and describes resource based theory of the firm, and provides a conceptual framework for the research within this thesis.

2.1 Resource Based Theory of the Firm

Resource based theory of the firm was introduced by Barney (1991) in the seminal work titled, "Firm resources and sustained competitive advantage." Resource based theory, or resource based view (RBV) is very helpful to provide context to the research within this thesis. RBV argues that there is a connection between a firm's sustained competitive advantage, and the strategic resources used by the firm (Barney, 1991). In this context, the term "resources" is defined by Barney (1991, p. 101) as, "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm to conceive of and implement strategies that improve efficiency and effectiveness." Barney et al. (2010) argues that CSR actions, such as sustainability certification, are considered a strategic resource.

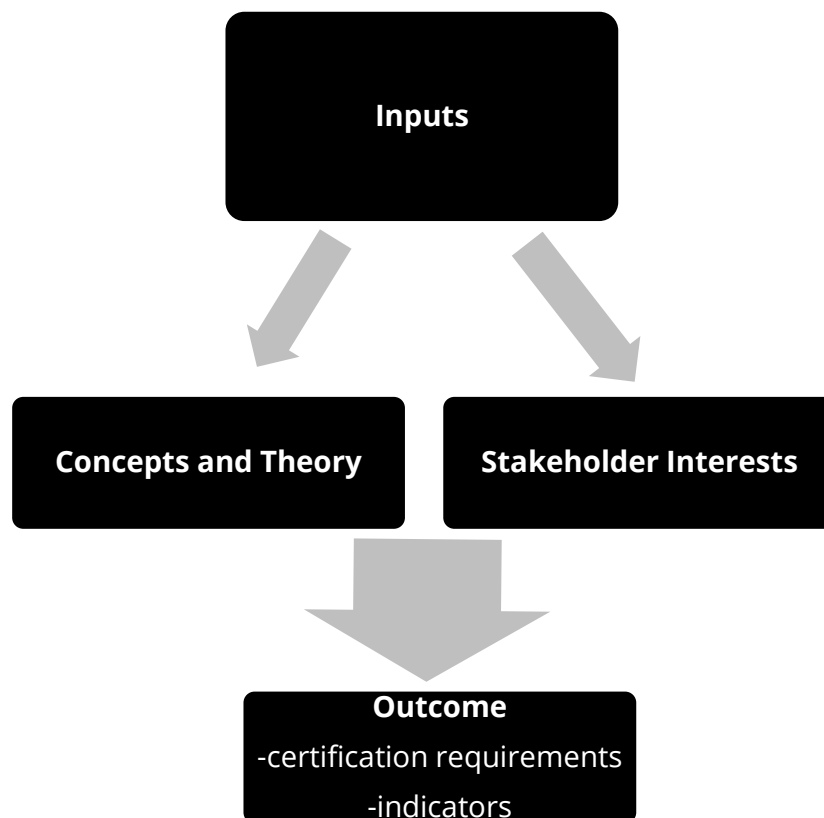
The research within this thesis is aligned with Barney's (1991) resource based theory. Through meeting the requirements in the proposed certification scheme in Appendices 1 and 8, Ontario craft breweries would employ a strategic resource that may

offer a sustained competitive advantage. Applying Barney's (1991) resource based theory to the research within this thesis provides additional context for the purpose the research.

2.2 Conceptual Framework

An illustrated conceptual framework is useful to communicate the constructs within this research. The conceptual framework employed within this thesis to produce a proposal for a sustainability certification scheme is pictured below in Figure 1.

Figure 1: Conceptual Framework



Multiple inputs have been used within the research in this thesis. Inputs include academic literature, public reporting from breweries, government publications, interviews

with breweries, and interviews with certification administrators. Through examining inputs in an exploratory fashion, important data has inductively emerged. Resource based theory, and the concept of information inductance help shape the outcome. Stakeholder interests identified through interviews also shape the outcome. The outcome of the research performed is a written document outlining proposed requirements for a sustainability certification (available in Appendix 8), and a list of sustainability indicators (available in Appendix 1).

3.0 Literature Review on Regulation

Relevant aspects concerning regulation and self-regulation will be reviewed within this chapter. Self-regulation will be identified, categorized, and defined. CSR and CS will be defined and discussed. EMSs and certification will be defined and discussed. The challenges to adopt codes and standards will be reviewed, as will the benefits to adoption. Sustainability management as it relates to SMEs will be reviewed and will consider the unique challenges faced by SMEs. Similar research studies will be discussed. Each of the topics identified above will be reviewed with the perspective of their potential application to a certification scheme for the craft brewing industry in Ontario.

3.1 Public Regulation in Ontario

Modern governance of environmental matters in Canada has been predominantly managed through the command and control approach to public regulation since the 1970s (Webb, 2007). There have been more recent changes within public regulations to improve governance, such as a change favouring performance targets rather than requirements for prescriptive technology (Streurer, 2013; Webb, 2007). Existing public regulations impacting craft breweries concern the topics of wastewater, and labour.

3.1.1 Wastewater Regulation

Wastewater is the first environmental regulatory concern faced by Ontario craft breweries, and is a very important topic to consider for craft breweries. Public regulation concerning wastewater in Ontario will be reviewed.

The existing public regulatory environment in Ontario relevant to wastewater effluent in craft breweries is grounded in provincial statutes, and municipal by-law. The policy instruments used for regulation are largely dominated by command-penalty regulations within these statutes. The Ontario Environmental Protection Act (OEPA) (1990), Ontario Water Resources Act (OWRA) (1990), and the Ontario Building Code Act (OBCA) (1992) are the three provincial statutes constituting the source law responsible for regulating wastewater effluent. Regulations have been made pursuant to the OWRA to manage the discharge of wastewater into the natural environment (Ontario, 2016a). The OEPA regulates wastewater within 9 industrial sectors under the Municipal Industrial Strategy for Abatement (MISA) (Ontario, 2016a), however, the craft brewing industry is not relevant to those 9 sectors. The OBCA regulates the use of on-site sewage systems for residential and industrial facilities that do not exceed 10,000 liters per day (Joy, 2014). Municipalities regulate wastewater connected to municipally managed sewer systems through the use of bylaw. Municipal bylaw, and the OBCA are both relevant to craft breweries.

The OBCA regulates 1.2 million on-site sewage systems in Ontario (Joy, 2014) through a combination of prescriptive, and performance based standards. On-site sewage systems emitting more than 10,000 liters per day are regulated by the OWRA and require an environmental compliance approval (Joy, 2014). Prescriptive standards include the use of specific technology, such as the use of a leaching bed for sub-surface dispersal in combination with a sequencing batch reactor (Joy, 2014). The OBC does not allow for the

use of some newer technologies such as membrane bioreactors (Joy, 2014). The OBCA also has performance based standards such as effluent-parameter requirements (Joy, 2014). Systems regulated under the OBCA are often located in rural areas, and are never attached to municipal sewer systems. Joy (2014) has identified the leniency of the OBCA regulations and enforcement measures by establishing that most systems are not monitored. Self-regulation has the potential to play a large role in rural areas that are not frequently monitored.

Section 63 of the OWRA outlines the provisions and requirements a municipality may take to apply for a sewer works project with the Ontario Clean Water Agency (Ontario Water Resources Act, 1990). The municipality of Ottawa has done so, and will be further considered to examine municipal bylaw concerning wastewater. The sewer-use bylaw regulates discharge to the municipal sewer system with quantitative performance-based standards. The bylaw sets reporting requirements, fines for offences, disposal fees, effluent parameters, and enforcement measures (Ottawa, 2017a). The effluent parameters relevant to the craft brewing industry include the following: BOD is set at 300 mg/L; TP is set at 10 mg/L; TSS is set at 350 mg/L; temperature is set at 60 degrees Celsius; and the acceptable range for pH is between 5.5 and 11 (Ottawa, 2017b). Fines for offences by a corporation are set at up to \$50,000 for the first offence, and up to \$100,000 for subsequent offences (Ottawa, 2017a). Fines for individuals responsible are set at up to \$10,000 for the first offence and up to \$25,000 for subsequent offences (Ottawa, 2017a). Municipal enforcement officers have the right to entry, and are responsible for issuing

finances, and enforcing parameters (Ottawa, 2017a). The municipal bylaw regarding wastewater in Ottawa has been used for a simple case study. Wastewater bylaw within other municipalities in Ontario is expected to have slightly different requirements.

3.1.2 Labour Regulation

Statutes are used to regulate labour within Ontario. Employment standards, health and safety, and labour relations are all topics managed by the Ministry of Labour (Ministry of Labour, 2017). Employment standards, health and safety, and labour relations will all be discussed further as they relate to Ontario craft breweries.

Source law concerning employment standards includes the Employment Standards Act (2000), and the Pay Equity Act (1990). The Employment Standards Act (2000) outlines requirements on the payment of wages, gratuities, continuity of employment, hours of work and break times, overtime pay, minimum wage, pay equity, vacation pay, benefits plans, leaves of absence, and employment termination. Employment standards officers are responsible for enforcing the provisions within the Employment Standards Act (2000). The Pay Equity Act (1990), outlines requirements for public sector, and large private sector employers concerning equitable employment and pay for both sexes. The Pay Equity Act (1990) does not apply to firms with less than 500 employees, and is not relevant to craft breweries in Ontario. Self-regulation may help improve employment equity within craft breweries in Ontario.

The Occupational Health and Safety Act (1990) is the source law on health and safety enforced by the Ministry of Labour. The Occupational Health and Safety Act (1990) outlines requirements for employers, owners, supervisors, and workers. Topics covered include violence and harassment, toxic substances, right to refuse unsafe work, employer reprisals, required notices, enforcement, and penalties (Occupational Health and Safety Act, 1990). Material safety data sheets for hazardous material are required to be available to workers (Occupational Health and Safety Act, 1990). Hazards are required to be assessed (Occupational Health and Safety Act, 1990). Employers are required to create policies regarding workplace violence and harassment (Occupational Health and Safety Act, 1990). Inspectors are given the responsibility to enforce the Occupational Health and Safety Act (1990).

The Ministry of Labour (2017) is responsible for labour relations in Ontario. Workplace disputes arising from relevant statutes are settled by the Ministry of Labour (2017). Topics may include wage settlements, and bargaining rights (Ministry of Labour, 2017).

3.1.3 Shortcomings of Public Regulation

Public regulation is widely successful to improve the environmental impact of Multi-National Corporations (MNCs) (Webb, 2007), and yet still has shortcomings. Administrative and financial resources required to enforce public regulation are extensive (Webb, 2007). Hard regulations may damper innovation, and may lead to firms only seeking to fulfill the bare-minimum requirements within the regulations (Webb, 2007). Public regulations can

also create a negative relationship between the regulatory body enforcing regulations, and the firms being regulated (Webb, 2007). Public regulation is also less applicable to Small and Medium sized Enterprises (SMEs) (Graafland & Smid, 2016). Ontario public regulations do not address the variety of social and environmental impacts created within the craft brewing industry. Public regulations are insufficient to properly address sustainable development within the craft brewing industry in Ontario.

3.2 Types of Regulation

Jordan (2008) correctly affirms that a significant change in governance may be required to achieve sustainable development. Recently, since the beginning of the 1990s, there has been a drastic change in governance concerning Corporate Social Responsibility (CSR) within MNCs (Brejning, 2012; Streurer, 2013). MNCs have begun to take responsibility for social and environmental aspects within their individual organizations signally a shift away from public command and control style regulations in favour of private regulation (Streurer, 2013; Webb, 2012).

To understand the shift in regulation style, it is necessary to define regulation and identify the different types of regulation. In the 1970s the economic theory of regulation became an important topic of research. Stigler (1971) suggested that regulation was developed with the intention of benefiting industry members. Selznick (1985) later claimed that regulation was a tool used by government to exercise control over activities within MNCs that were held in high importance by communities. Specifically, Selznick (1985) defined regulation as the “sustained and focused control exercised by a public authority

over activities valued by the community” (p. 363). Literature has since changed focus to understand regulation as it relates to the dynamic relationship between industry actors, government actors, the environment, and civil actors (Hutter, 1997; Majone, 2002; Webb, 2012). There has been a broad range of literature written on regulation within different social science disciplines with topics such as economics, food safety, and healthcare (Koop & Lodge, 2017).

The interest within this research is to understand how regulation interacts with public actors, private actors, and civil actors with respect to the impacts it may have on environmental, social, and economic performance in the craft brewing industry. With this perspective, regulation may be defined as a set of rules established with the intent of guiding the behaviour of one or more actors within private, public, and civil society. This definition does not define the actor creating the rules, and does not define a strict outcome resulting from the rules. This definition does include civil society as a separate actor from private and public actors. This definition is in line with the definition suggested by Koop and Lodge (2017) that reads, “[Regulation is] the intentional intervention in the activities of a target population” (p. 105). This definition is also complementary to Majone’s (2002) definition reading, “[Regulation is a set] of rules issued for the purpose of controlling the manner in which private and public enterprises conduct their operations” (p. 9). It should be acknowledged that regulation includes an enforcement mechanism to persuade, or ensure the targeted actor(s) adhere to the defined rules. The definition proposed above

identifies that the enforcement mechanism is merely a guide, and cannot guarantee that the targeted actor(s) do adhere to the rules.

There are several different types of regulation that need to be identified. The literature on governance often only presents two main classifications of regulation. Public regulation refers to regulation created and enforced by governments, and self-regulation refers to regulation created and enforced by private organizations (Doelle et al., 2012; Knill & Lehmkuhl, 2002; Sheehy, 2012; Tollefson et al., 2012; Treib et al., 2007). A third separate type of regulation has been differentiated known as civil regulation (Streurer, 2013). Civil regulation refers to regulation created and enforced by civil organizations such as NGOs.

Combinations of the three main types of regulation have also been identified to result in seven distinct categories of regulation. The main three categories are as follows: 1) public regulation, 2) private regulation, and 3) civil regulation. Four sub-categories have been identified by creating combinations of each of the three main categories to create four sub-categories of co-regulation. The remaining sub-categories are as follows: 1) private co-regulation (private-civil), 2) Public co-management (public-civil), 3) Public co-regulation (public-private), and 4) tripartite (public-private-civil) regulation (Streurer, 2013).

Public regulation includes both hard government regulation and soft government regulation (Streurer, 2013). Hard government regulations are mandatory and may carry enforcement measures (Streurer, 2013). Legislatures have been enacted, creating mandatory laws that are enforced by the executive and judicial branches of government (Streurer, 2013). Examples of hard government regulations include laws, and economic

tools such as taxes, cap-and-trade schemes, and fees (Hood, 1986; Streurer, 2013). As noted earlier, hard regulations can be resource intensive for government bodies, and hinder innovative solutions on behalf of industry (Webb, 2007). Soft government regulations are voluntary. Soft government regulation is concerned with persuading behaviour, and does not have the same enforcement measures that hard regulation does (Streurer, 2013). Soft regulation often includes public actors providing access to information, guidelines, or leadership through organizing groups (Hood, 2007; Streurer, 2013). Soft regulation may also include economic tools, such as subsidies or grants (Streurer, 2013).

Private regulation is not a recent endeavor, professional standards have been made by trade groups dating back centuries (Baldwin & Cave, 1999), and the literature on self-regulation is well developed (Mills, 2016). Modern self-regulation refers to private organizations creating, and adhering to regulations without civil or public actors interfering (Gunningham & Rees, 1997; Sinclair, 1997; Streurer, 2013). Self-regulation is considered voluntary, and is meant to support the interests of the general public (Maxwell et al., 2000). Self-regulation may be a response by business to the interests and pressure of civil actors (Zadek, 2004), self-regulation may be an attempt to address a lack of globalized governance (Zadek, 2008), and it may be a strategic decision with the interest of avoiding more stringent public regulations (Maxwell et al., 2000).

Private self-regulation may be separated into two distinct categories. The first category is self-regulation by a single business in which a single firm defines rules,

monitors adherence to those rules, and enforces adherence to those rules. The second category is industry self-regulation which refers to a group of businesses, or an industry association that creates rules, monitors adherence to those rules, and enforces adherence to those rules (Streurer, 2013). Responsible Care (Chemistry Industry Association of Canada, 2016) is an example of industry-led self-regulation. CSR programs, codes of conduct, some corporate policies, Environmental Management Systems (EMSs), certification schemes, and sustainability reporting or CSR reporting are examples of voluntary self-regulation (Post et al., 2002; Streurer, 2013). Self-regulation may also take the form of rules set by a firm that are enforced on suppliers (Streurer, 2013). Industry self-regulation may take a hard, or soft approach. The hard approach meaning that enforcement measures for breaking or not meeting a stringent code or standard would result in sanctions or the expulsion from a certification (Sheehy, 2012; Streurer, 2013). A soft approach may have more lenient requirements without significant repercussions for not meeting or breaking the code.

Civil regulation refers to regulation led by civil actors. Civil regulation is less prominent in regulatory literature, but needs to be identified as a separate form of regulation. Civil regulation imposes pressure on firms to conform to moral interests (Mitchell et al., 1997) often through multiple stakeholders confronting firms directly about a topic (Zadek, 2004). Civil actors include societal organizations, employees, consumers, and local communities (Streurer, 2013). Civil regulation may take the form of standards as a very stringent form, or it may be less formal pressure asserted by civil actors. An example

of a civil regulation in the form of a standard is Rugmark (Rugmark India, 2012) which is a certification and ecolabel made by a non-profit Non-Governmental Organization (NGO). Ceres is a great example of a non-profit civil actor that lobbies policy makers, pressures private firms, and pressures investors to work towards better social and environmental outcomes (Ceres, 2016).

The four categories of co-regulation are created through collaboration between two or more of the main three societal actors; public, private, and civil. Collaboration between all three societal actors has only recently been acknowledged in academic research (Streurer, 2013). Previously literature has limited the scope of co-regulation to refer to collaborations between public and civil actors and public and private actors (Senden, 2005). Private co-regulation, and tripartite co-regulation need to be acknowledged and separately distinguished from the other forms of regulation (Albareda, 2008). Private co-regulation refers to collaborative regulation between civil and private actors. The Marine Stewardship Council (Marine Stewardship Council, 2017), and the Forest Stewardship Council (Forest Stewardship Council, 2017) both offer certification schemes that are prominent examples of private co-regulation. Tripartite co-regulation includes all three societal actors collaborating. Two prominent examples of tripartite co-regulation are the CSR reporting standards created by the Global Reporting Initiative (GRI) (2017), and the social responsibility guidelines created by the International Organization for Standardization titled ISO 26000:2010 (International Organization for Standardization, 2010).

Public co-management involves collaboration between public and civil actors. Ostrom et al. (1999) identified how civil and public actors collaborate to manage and regulate common-pool resources to fend off Garrett Hardin's tragedy of the commons (Hardin, 1968). Sander (2009) identifies the partnerships between public and private organizations within Brazil, India, and China that govern economic, social, and ecological factors. Partnerships developed in the Worlds Summit for Sustainable Development in 2002 are examples of public co-regulation (Sander, 2009).

The focus of this research will be on self-regulation. The terms self-regulation and private regulation will be used interchangeably within this research and signal the absence of public and civil actors within the process of creating, and administering the regulation. Self-regulation will include firm-led regulation, and industry-led regulation. Relevant topics within self-regulation are CSR programs, standards and codes, and sustainability reporting. These topics will be considered later in this paper.

The literature on the interests of an organization to partake in self-regulation is well developed, and identifies many benefits. Self-regulation may be a response by private actors to the interests and pressure of civil actors (Zadek, 2004), and it may be a strategic decision with the interest of avoiding more stringent public regulations (Helms & Webb, 2014; Maxwell et al., 2000; Webb, 2007). Mills (2016) suggests that the popularity of self-regulation in the air transport industry was influenced by lack of global governance. Self-regulation, including CSR strategy and annual reporting, has been found to complement existing public regulation and is suggested to be stringent enough to potentially replace

public regulation (Mills 2016). Similarly, van der Muelen (2011) found that self-regulation in the food industry is more stringent than current public regulation, and offers a more robust governance structure globally that existing public regulation cannot offer considering the large variance in public regulation between differing nation states. Specifically, Van der Muelen (2011) found that codes and standards in the form of certification schemes and Management Systems (MSs) are more proficient to manage environmental and social concerns than existing public regulation, and the effects of non-compliance are far greater. For example, if a supplier to a food processing firm does not meet certain certification requirements, the food processing firm may decide to choose a different supplier. Similarly, self-regulation in the craft brewing industry in Ontario would also be more proficient to manage social and environmental topics.

Self-regulation has become a leading force to bring societal interests, and CSR to MNCs (Webb, 2012). Other benefits of self-regulation include the potential to reduce accidents, increase efficiency, and improve public perception for the adopting firm (Webb, 2007). It is to the benefit of society, and to the benefit of the adopting firm to take part in a form of self-regulation. The craft brewing industry in Ontario is expected to gain from these benefits as well. The following research will consider different types of self-regulation with respect to their application within the craft brewing industry in Ontario. Further benefits and limitations will be discussed.

3.3 Corporate Social Responsibility and Corporate Sustainability

CSR, Corporate Sustainability (CS), EMSs, certification schemes, and CSR or sustainability reporting are all examples of self-regulation (Post et al., 2002; Sheehy, 2012; Streurer, 2013). The terms “codes”, and “standards”, have also been used within the literature to reference EMS standards, certification schemes, and reporting standards (Brunsson et al., 2012; Helms & Webb, 2014; Van der Meulen, 2011). All of these examples of self-regulation have similar functions and goals, and need to be properly differentiated and defined. CSR, CS, EMSs, certification schemes, and sustainability reporting will be defined and explained with the perspective of their potential application to the craft brewing industry in Ontario.

There has been a significant struggle to adequately define CSR in academic literature, and in other contexts (Sarkar & Searcy, 2016; Sheehy, 2015). Sheehy (2015) identifies three separate agendas with differing objectives that result in different interpretations and definitions of CSR. The three agendas Sheehy (2015) identifies are industry-led agendas, agendas originating from academia, and political agendas. Industry negatively influences the definition of CSR through the interest of some individual firms to pass off business-as-usual operations as CSR and the inevitable result is no environmental, social, and governance (ESG) improvement (Sheehy, 2015). Academia has the interest to characterize CSR through the use of subject-specific description and classification which leads to a failure to recognize the nature of CSR (Sheehy, 2015). Differing underlying

political philosophies relevant to the divide between the public and private sphere of responsibility are inherent in every attempt to define CSR (Sheehy, 2015).

The World Commission on Environment and Development (WCED) offered a popular definition of sustainable development that included the necessity to “meet[s] the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland & World Commission on Environment and Development, 1987, p. 41). From the WCEDs popular definition, the concept of people, planet, and profit, or triple-bottom-line has emerged. CSR has been written to be a reactionary response to the necessity of an organization to address sustainable development, effectively meaning that both CSR and CS work towards the same goal (Nicolaescu et al., 2015). Similarly, ISO 26000 – Guidance on Social Responsibility (International Organization on Standardization, 2010) explains that the highest objective of an organization’s CSR program should be to achieve sustainable development. Within ISO 26000:2010 – Guidance on Social Responsibility (International Organization on Standardization, 2010, p. 3), social responsibility is defined as follows:

“[Social responsibility is the] responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behaviour that

- contributes to sustainable development, including health and the welfare of society;
- takes into account the expectations of stakeholders;

- is in compliance with applicable law and consistent with international norms of behaviour; and
- is integrated throughout the organization and practised in its relationships.”

Sarkar and Searcy (2016) identify sustainability with relation to CSR to be one of the following six concepts involved with CSR: sustainability, economics, ethical, social, stakeholders, and voluntary. Sarkar and Searcy (2016, p. 1433) go even further to provide a concrete definition of CSR that reads as follows:

“CSR implies that firms must foremost assume their core economic responsibility and voluntarily go beyond legal minimums so that they are ethical in all of their activities and that they take into account the impact of their actions on stakeholders in society, while simultaneously contributing to global sustainability.”

Sarkar and Searcy’s (2016, p. 1433) definition includes the notion of sustainable development through referencing development as an “economic responsibility” and clearly outlines the necessity to consider societal and stakeholder interests. Sarkar and Searcy (2016) also require a contribution beyond the minimum legal requirements towards sustainability on a global context. Sarkar and Searcy (2016) also address the voluntary nature of CSR. Sarkar and Searcy’s (2016) definition of CSR will be accepted for the purpose of this research.

In a less systematic approach, Gaurangkumar (2015) declares CSR to be the responsible management of ESG aspects derived from stakeholder interests. This definition

seems to fit more closely with definitions of corporate sustainability. CS and CSR both seek to manage economic, social, and environmental impacts, and over time the two definitions have been merging (Montiel, 2008; Nicolaescu et al 2015). The terms CSR and CS have at times been used as synonyms within academic literature (Lo & Sheu, 2007; van Marrewijk, 2003). Alternatively, other academic literature identifies differences. Bergman et al. (2017) argue that CSR is unevenly focused on the philosophy and theory of the relation between social interests and the responsibility of the firm, whereas CS focuses more specifically on performance and practical action. Sharma and Ruud (2003) argue that CSR places higher importance on ethical and social concerns in comparison with the high environmental focus of CS.

Academic literature is not in agreement regarding the precise nature, and relationship between the definitions of CSR and CS. It is impossible, however, to theoretically separate the two terms by arguing they have no association (Bergman et al., 2017). It is necessary to provide an acceptable definition for corporate sustainability. The accepted definition for the purposes of this thesis will be one offered by Bergman et al. (2017) in an article closely examining the literary relationship between CSR and CS titled, "An Empirical Exploration, Typology, and Definition of Corporate Sustainability." Bergman et al.'s (2017, p. 10) definition reads as follows:

“Corporate sustainability refers to a systematic business approach and strategy that takes into consideration the long-term social and environmental impact of all economically motivated behaviours of a firm in the interest of consumers, employees, and owners or shareholders.”

Important to Bergman et al.'s (2017) definition is the focus on the impact of social and environmental aspects as they relate to economic interest. The definition also identifies the necessity for long-term considerations, and grounds the interests of CS to regard those posed by stakeholders (Bergman et al., 2017). In this circumstance, the term, “consumers” may be accepted to represent community and societal interests in general, not solely individuals purchasing a product or service.

Firms may engage in CS management at the enterprise level, or choose to focus on individual products or business units. It is important to specify the intricacies related to sustainability management at the enterprise level. Rather than solely focusing on internal operations, a firm must also consider their supply chain, and their sustainability context (Searcy, 2014). Searcy (2014) articulated the notion of enterprise sustainability to include consideration of the three topics of supply chain, sustainability context, and the focal firm. Searcy (2014, p. 123) offered a formal definition of enterprise sustainability to read as follows:

“The creation of stakeholder-focused and intra- and inter-organizational business systems that address the integrated economic, environmental and social aspects of performance over the short and long term within the limits imposed by society and nature.”

Searcy's (2014) definition identifies multiple important aspects involved with enterprise sustainability. First, Searcy (2014) acknowledges that something will be created, underlining the need for enterprise sustainability not to be a business-as-usual practice. Second, Searcy (2014) confirms that enterprise sustainability will be focused on stakeholders' interests rather than solely the interests of the organization. Third, Searcy (2014) acknowledges that enterprise sustainability will impact business systems within the leading organization, and outside the organization; impacts imposed on suppliers are one example. Fourth, Searcy (2014) secures the definition within the context of economic, environmental, and social aspects. Fifth, the necessity to consider performance is identified (Searcy 2014). Sixth, timeframe is considered with a clear necessity for both short and long term impacts (Searcy 2014). Finally, Searcy (2014) declares that both nature and society create restraints on the function of an organization. For example, planetary boundaries create restraints, as do the ever-continuing material needs of consumerist society. For the purposes of this research, Searcy's (2014) definition for enterprise sustainability will be accepted.

Undoubtedly, the concepts of CSR and CS are very similar, and at times used interchangeably within academic literature, and within the corporate world (Montiel, 2008).

For the purposes of this research, firms may use either term to relate to their self-regulatory management practices, and rule instruments they use relating to social, ethical, and environmental concerns.

3.4 Environmental Management Systems and Certification

EMSs have been a prominent method used by firms to appropriately manage corporate behaviour affecting the environment. EMSs can be a powerful tool that firms may use to reduce risk, and improve environmental performance. There are examples in the literature of the terms “standards” and “codes” being used to refer to EMSs, as well as other forms of self-regulation (Brunsson et al., 2012; Helms & Webb 2014; van der Meulen, 2011). Theoretic concepts relating the EMSs that are described within literature as standards and codes will be considered relevant in this context.

Kinsella (1999) offers a definition of an EMS to be a management framework developed to purposely give attention to the operations of a firm as they create impacts on the environment. Krut and Gleckman (1998, p. 34) define an EMS as “an institutionalized system designed for the management of people and institutions that impact the environment.” The International Organization for Standardization (International Organization for Standardization, 2015, p. 4) defines an EMS as “[the] part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities.” For the purpose of this research, the International Organization for Standardization’s (2015) definition of EMS will be accepted. The definition focuses on actions required, and appropriately positions an EMS within the management

structure of the adopting firm. The definition also firmly identifies the role of corporate policy with respect environmental management (International Organization for Standardization, 2015).

There are different EMS standards available for firms to apply within their organizations. Firms may apply to be certified or registered, and registration often requires a third party audit (Kirkland & Dixson, 1999). Firms are not required through legislation to implement an EMS, however, a significant benefit of implementing an EMS is the risk reduction it may offer through the proof of due diligence. Firms still commonly adopt EMSs without having them registered or certified (Morrow & Rondinelli, 2002), and still receive additional benefits. ISO 14001:2015 is the most recent offering from the popular International Organization for Standardization. The Eco-Management and Audit Scheme (EMAS) is another very prominent EMS standard created by the European Commission (European Commission, 2017).

Although both EMAS, and ISO 14001 standards are very popular within EMS literature, ISO 14001 is more prominent, and will be further considered to offer an understanding of how the requirements within ISO 14001 may differ from other sustainability-related certification schemes. ISO 14000 series of standards was launched in 1996 in response to the suggestion emerging from the 1992 United Nations Rio Conference on Environment and Development to establish a self-regulatory mechanism necessary to achieve sustainable development (Christmann & Taylor, 2006). The International Organization for Standardization does not allow firms to use their logo as a form of

ecolabel. ISO 14001 follows the Deming Cycle (Schoffman & Tordini, 1999), commonly referred to as Plan, Do, Check, Act (PDCA), and requires continual improvement over time, yet does not contain specific performance requirements (International Organization for Standardization, 2015). ISO 14001 does require regulatory compliance, and does require a commitment from the top-level decision maker within the firm (International Organization for Standardization, 2015). Environmental policy is required within ISO 14001, and the responsibilities must be appropriately defined and delegated (International Organization for Standardization, 2015). Materiality must be defined, and obligations and objectives must be explicitly articulated (International Organization for Standardization, 2015). There are also requirements for what needs to be documented, and audited (International Organization for Standardization, 2015). Operational controls must be defined, and adopters are required to include a life cycle perspective (International Organization for Standardization, 2015). Data collection related to defined aspects is required, as is an internal audit, and performance review by management (International Organization for Standardization, 2015).

Benefits of adopting an EMS have been widely identified. The following list identifies important benefits: improved environmental performance; improved efficiency regarding resource use; reduced pollution and waste; a reduction of risk; proof of due diligence; ethical responsibility; improved interdepartmental communication; expanding existing markets; introduction to new markets; improved customer satisfaction; competitiveness; improved customer retention; improved public image; legitimization that grants credibility

within the marketplace; access to public funding programs; improved partnerships and relationships within the supply chain; reduction of the perception of transactional uncertainty and reduction of informational uncertainty (Akerlof, 1970; Bansal & Roth, 2000; DiMaggio & Powell, 1983; Michael et al., 2010; Morrow & Rondinelli, 2002; Helms & Webb, 2014). Benefits are not equal between all codes and standards. Perceptions of a specific code or certification scheme, or perceptions of the legitimization of a specific standard or certification scheme have a large impact on the benefits resulting from the standard (Helms & Webb, 2014). In this regard, building legitimacy for a sustainability certification scheme for Ontario craft breweries would be useful.

ISO 14001 does not benefit from the same perception from all stakeholders. ISO 14001 is viewed by many firms to have an inhibiting cost requirement, and is perceived to result in little value (Boiral, 2007; Helms & Webb, 2014). Similarly, ISO 14001 would be prohibitively expensive to register for Ontario craft breweries, and result in little value.

Other far less stringent standards or certification schemes suffer from the perception by potentially adopting firms, that they have very few costs, relatively little rigour, result in little improvement, and have a poor public perception (Christmann & Taylor, 2006; Helms & Webb, 2014). It has also been identified that different firms may adopt the same standard with a different outcome (Christmann & Taylor, 2006). Some firms may adopt ISO 14001, or another standard, for the purpose of meeting stakeholder expectations, and may not actually apply new policies in practice, resulting in no positive impacts that were intended by the standard (Stevens et al., 2005). Unless the decision

makers within firms actually use environmental policy within their decision making, there will be no benefit from adopting an environmental standard (Christmann & Taylor, 2006). Seemingly, the benefit of policy to environmental performance would be to influence decision making. Targeting firms' decision making through governance mechanisms would be useful to influence performance outcomes. Some factors that influence a positive result from implementing a standard include the following: upper management perception of stakeholder pressure; upper management perception that a standard will improve public perception of the firm; and that standards are implemented into daily actions and communicated through appropriate training (Stevens et al., 2005).

Perception and legitimation have a large impact on the total potential benefit of standards and certification schemes, and the resulting importance must be acknowledged. Achieving legitimacy has been found to be a difficult task for firms (Ashforth and Gibbs, 1990; Suchman, 1995). A perception from upper management towards the code or standard, and a perception from other outside stakeholders towards the code or standard must be in high regard. Positive perception not only influences the outcomes resulting from implementing a standard, but it may also influence the popularity of adoption of a specific code or standard (Helms & Webb, 2014).

There are two important perceptions that a potentially adopting firm must have towards a code or standard to influence the decision of the firm to adopt. First, the firm must perceive the code or standard itself as being legitimate. Second, the firm must have the perception that the code or standard will aid in the legitimation of the adopting firm

(Helms & Webb, 2014). Aspects that may influence a potential adopter include the content of the standard or code, how the code was developed and who helped develop it, and the potential for communication between the adopter and the code developer before adoption (Helms & Webb, 2014). The inclusion of industry members within the development of a code may influence perceptions of legitimization.

There are many challenges, or limiting factors that disincentivize a potential adopter from adopting an EMS, or ISO 14001 specifically, beyond a negative perception of legitimization. As stated earlier, the high cost of adoption may restrict organizations from adopting an EMS (Boiral, 2007; Helms & Webb, 2014). The potential adopter may lack the technical, or personal resources required, and may lack employee motivation (Darnell et al., 2000; Nishitani, 2011). ISO 14001 specifically lacks guidance on how the standard may be implemented resulting in a large variance of performance improvements (Poder, 2006). ISO 14001 emphasizes a commitment from upper management, and unevenly focuses on the necessity for all employees to be involved (Yarnell, 1999). These barriers would all be faced by Ontario craft breweries.

The business case for firms to adopt certification and reporting is well known, and has increasingly helped firms integrate CS concerns into strategy and decision making (Albertini et al., 2000; Buysse & Verbeke, 2003). Many benefits of adopting codes and standards have been identified earlier. The business case for improving CS performance through employing certifications and reports has been well identified within relevant literature. Adopting CS certification or reporting has proven to have a positive link to

financial performance (Ambec & Lanoie, 2008; Hart & Ahuja, 1996; Klassen & McLaughlin, 1996; Orlitzky et al., 2003), and to social and environmental performance (Blackman & Rivera, 2011; Rice & Ward, 1996). Ontario craft breweries may also benefit indirectly from financial performance improvements achieved through certification, as well as social and environmental performance improvements.

Financial, social, and environmental performance improvement is not the sole reason firms may choose to include CS considerations within strategy and management practice. Additional benefits, and more specific benefits have been identified in academic literature. Certification can be used by producers as a trusted market differentiator influencing consumers' purchasing decisions at the point of sale (Blackman & Rivera, 2011). Differentiation may also create a price premium for a certified product that directly increases a consumer's willingness to pay (Blackman & Rivera, 2011). Craft breweries could use certification as a market differentiator. Sustainability certification may also increase market access to firms by enabling products to sell in markets that were previously unattainable (Barry et al., 2012; Giovannucci & Ponte, 2005; Vogt et al., 1999). Certification may open new markets for certified craft breweries, especially with newly formed grocery retail partners. Delmas and Pekovic (2013) show that certification may also improve labour productivity. Prescriptive standards within certification have been identified as highly valuable, especially in combination with existing non-prescriptive regulation (Mcdermott et al., 2008). Djupdal and Westhead (2015) determined that legitimacy, and a perception of high-quality are two benefits that very small, and very young firms receive more than any

other size firm resulting from certification. The small Ontario craft breweries may benefit from improved perceptions of quality, and legitimacy through certification. Michael, Echols, and Bukowski (2010) identify that certification may reduce costs, meet regulatory requirements, improve operational effectiveness, improve stakeholder relationships, display legitimacy regardless of the size of firm, improve public image, and improve competitiveness in general. Sustainability certification may help craft brewers achieve all the benefits identified by Michael, Echols, and Bukowski (2010).

In an effort to reap the benefits that result from a reputation aligned with sustainability, firms may attempt to self-regulate without third-party assurance and make symbolic public declarations with the intent of building a brand aligned with sustainability. Baksi and Bose (2007) warn against this type of labeling, and public declaration. They argue that it does not always result in sustainability performance improvements, and often does result in business-as-usual operations (Baksi & Bose, 2007). Marketing communications with the intent of influencing consumers of the environmentally, or socially responsible aspects of a product or brand with little to no evidence of triple-bottom-line improvement, is known as greenwashing. Greenwashing has been present on the market place since the early 1970s when consumer interest in the environmental performance of firms, and of products started to grow (Lane, 2013). One powerful way for consumers to identify the difference between misleading greenwashing, and firms or products that actually make significant contributions to improve sustainability performance is through certification, and publicly displayed ecolabels. Developing an ecolabel within the proposed sustainability

certification presented later in this thesis may help consumers differentiate between breweries that offer misleading communications, and firms that do work towards more sustainable outcomes.

One definition of certification (Botegga & Freitas, 2009, p. 106) reads that “certification is a process where a third party verifies the fulfillments of a firm to certain criteria or standards.” Mori et al. (2016, p. 580) offer the definition that “certification schemes are processes by which products or services are produced or provided according to predetermined standards. The level of achievement of those standards by a product or a service is assessed and a certification or label is provided to demonstrate the level of achievement of that specific product or service against the standard.” Barry et al. (2012, p. 1) state that “certification systems typically evaluate and audit—according to environmental and/or social sustainability standards—the processes or methods by which products are produced.” For the purpose of this research, certification is defined as the process taken by a firm to follow defined rules or meet specified criteria that is coupled with a control mechanism to ensure process fulfillment.

Certification may be organized and administered by private, public, or civil organizations, and the organizations may be charitable, for-profit, or not-for-profit (Botegga & Freitas, 2009; Streurer, 2013). CS certifications may also be administered by private-public partnerships, private-civil partnerships, public-civil partnerships, or tripartite partnerships identified earlier in this paper (Streurer, 2013). Certification often requires auditing and third party assurance. Certification schemes often award the approved firm

with an ecolabel that may be displayed directly on a product. An ecolabel is a graphic design present at the point-of-sale visible to consumers that communicates that the product or organization is certified to a specific certification scheme aimed at improving ESG performance. Prominent certifications that award ecolabels include the Rainforest Alliance (Rainforest Alliance, 2016), and the Forest Stewardship Council (Forest Stewardship Council, 2017).

Sustainability certification schemes are not without criticism, and do not all have the same components. Mahenc (2009) identifies that consumer trust is an important factor for certification administrators to build credibility and legitimacy, and without building consumer trust there are marked difficulties to achieve credibility. Blackman and Rivera (2011) warn that some certification schemes may cater to already high-performing producers, and will result in little sustainability performance improvement. McCulskey (2000) identified the imperative for third-party monitoring to improve the results of certification. The two factors of cost, and accuracy of reporting were shown to have an impact on the benefits and success of certification (Mason, 2011). Mori et al. (2016) identified that accountability, transparency, consequences for broken commitments, vague language in the certification scheme, and the quality of reporting are all significant factors affecting the effectiveness and adaptability of a sustainability certification scheme. All of the factors, barriers and influences listed above are relevant to certification for Ontario craft breweries.

3.5 Performance and Reporting

It is necessary to review sustainability performance, and the composition of CSR/CS reports. There have been multiple studies to determine an appropriate sustainability assessment methodology, and to define a relevant methodology to determine material indicators for firms (Azapagic, 2004; Guthrie et al., 2008; Maxime et al., 2006; Mikkila & Toppinen, 2008; Nordheim & Barrasso, 2007; Palme & Tillman, 2008; Roca & Searcy, 2012; Siew, 2015; Van Berkel et al., 2008). There have also been private and civil efforts made outside of academia to define relevant indicators, determine appropriate performance assessment methodologies, and develop reporting guidelines and standards (Global Reporting Initiative, 2017). For the purposes of this thesis, the topics of performance and reporting will be reviewed to offer relevant information relating to a proposal for sustainability certification for the craft brewing industry presented later in this thesis.

Combined with previously identified influences for firms to adopt self-regulatory practice, there has been significant influence for firms to directly improve sustainability performance. Improving social and environmental performance has been proven to have a positive link to financial performance (Ambec & Lanoie, 2008; Hart & Ahuja, 1996; Klassen & McLaughlin, 1996; Orlitzky et al., 2003; Van der Laan, Van Ees, & Van Witteloostuijn, 2008). Similar to the benefits of CSR or CS management, academic literature finds that there are instances that managing sustainability performance may positively influence environmental and social performance outcomes (Blackman & Rivera, 2011; Rice & Ward,

1996), and other instances with marginal improvement, or a business-as-usual result (Baksi & Bose, 2007).

Christmann and Taylor (2006, p. 863) contrast the terms “symbolic” and “substantive” to identify how firms may adopt self-regulatory practice with no performance improvement, and other firms may adopt the same self-regulatory practice with notable performance improvement. Aspects within adoption, implementation, and management practice have been identified earlier that may influence a positive result. Additionally, resource dependence theory developed by Pfeffer and Salancik (1978/2003) identifies how the relationship between a producer and a supplier may be symbiotic to the point that demands made by the producer may have little or no resistance from the supplier. In contrast, Westphal and Zajac (1994 & 1998) identify how symbolic management is often associated with a lack of information symmetry that may be illustrated by misleading information being presented to stakeholders. Westphal and Zajac’s (1994 & 1998) findings illustrate the necessity for firms to properly represent performance information in order for performance improvement to occur. Within the proposed certification, focus should be kept on building an improved performance outcome specifically through building positive stakeholder relationships, and communicating accurate information to all stakeholders regarding performance outcomes.

Substantive requirements within standards outline specific quantifiable performance requirements relating to identified aspects, and may include prescriptive elements (Mcdermott, Noah, & Cashore, 2008). Alternatively, regulatory standards and

policies may be more flexible and less prescriptive. More flexible standards' requirements may be procedural, rather than substantive (Mcdermott, Noah, & Cashore, 2008).

Procedural policies require the adopter to create a plan, or a procedure to follow, rather than meeting a performance threshold or implementing a prescribed technology (Mcdermott, Noah, & Cashore, 2008).

Developing an appropriate list of indicators is very important to properly manage sustainability, and for CS management to result in improved performance. Daub (2007) describes how indicators represent the qualitative data regarding firms' sustainability performance, and for that reason are very important to improve performance. There has been significant research, academic and otherwise, regarding CS indicators to determine what indicators should be included in CS reporting (Antonini & Larrinaga, 2017; Global Reporting Initiative, 2017; Roca & Searcy, 2012; Statistics Canada, Environment Canada, & Health Canada, 2007). The GRI is a prominent organization with the goal of popularizing sustainability performance reporting among MNCs by offering an open-source standard for sustainability reporting that includes a list of indicators, and guidance for developing a report (Global Reporting Initiative, 2017). Notably, Tokos et al. (2012) have published a well written paper offering a suggested list of GRI-based indicators relevant to the brewing industry. Roca and Searcy (2012) review reports from 94 firms, and cross-referenced them with indicators developed by GRI. The topic of materiality is very important for the proposed certification within this thesis. Appendix 1 lists the initial proposed list of indicators suggested to be used within the proposed certification scheme presented later

in this thesis. The indicators in Appendix 1 draw from multiple sources, including Roca and Searcy (2012), and Tokos et al., (2012). The proposed list of indicators will be important to influence a tangible performance benefit to potentially adopting firms. It will be suggested later in this thesis that the proposed list of indicators in Appendix 1 will require further input from multiple stakeholder groups that were not included within the scope of this research study.

3.5.1 Information Inductance

CSR or CS reporting is a prominent method employed by firms to publicly communicate information to stakeholders. Through publicly communicating data, the concept of information inductance influences improved performance outcomes. Prakash and Rappaport (1977, p. 29) identified information inductance as, “the process whereby the behaviour of an individual [or firm] is affected by the information he [or she] is required to communicate.” The concept of information inductance suggests that simply by requiring a firm to publicly report on CS performance the firm will improve CS performance. This may be a useful concept to apply to certification within the craft brewing industry.

There has been significant research regarding the relationship between the environmental performance of firms and the information that is voluntarily disclosed within annual reports. Information inductance is found to have a positive result regarding environmental performance within firms that voluntarily publicly report on sustainability topics (Clarkson et al., 2008). Clarkson et al. (2008) reviewed 191 firms in five different industries operating in the USA and found that better environmental performance was

achieved for firms that publicly reported on more voluntary environmental indicators.

Ahmadi and Bouri (2017) had similar findings within research performed on 40 firms within France. Ahmadi and Bouri (2017) also found a positive relationship between public disclosure of environmental indicators, and environmental performance.

The concept of information inductance described by Prakash and Rappaport (1977), and research performed by Clarkson et al. (2008), and Ahmadi and Bouri (2017) all suggest that simply by publicly reporting on defined sustainability indicators would result in improved sustainability performance. These findings suggest that craft brewers in Ontario voluntarily publicly reporting on defined sustainability indicators may improve sustainability performance.

3.6 Corporate Sustainability and SMEs

Literature regarding sustainability management within SMEs is well developed. Literature considers the strategy employed by SMEs to integrate sustainability concerns into organizational decision making (Shields & Shelleman, 2015). Sustainability management tools are assessed within the literature (Horisch, Johnson, & Schaltegger, 2015; Johnson & Schaltegger, 2016). Models to assess performance are considered (Singh, Olugu, & Fallahpour, 2016). The factors positively and negatively affecting the adoption of codes and standards are also addressed (Hillary, 2004; Tilley, 1999). Generally, literature regarding CS management in SMEs is very helpful to understand the unique challenges faced by SMEs in comparison to MNCs and will prove to be very useful to relate to craft breweries in Ontario.

SMEs contribute significantly to employment across Canada. In Ontario alone 91.2% of all employment is found within SMEs (Innovation Science and Economic Development Canada [ISED], 2016). In the manufacturing industry in Ontario, 84.7% of all employment is within SMEs (ISED, 2016). Not only is there significant employment within SMEs, there is also significant sustainability impacts resulting from SME operations. Hillary (2000) established that approximately 90% of all firms in the world are SMEs and approximately 70% of all pollution globally originates from SMEs. In an article on the gap between attitude and behaviour in SMEs to adopt environmental management, Tilley (1999) reveals that stakeholders view the environmental impacts of SMEs to be negligible compared with large firms, and as a result there is little pressure for SMEs to publicly report. Public reporting, and formal self-regulation are far less prominent within SMEs.

The nature of SMEs is inherently different than that of large firms and MNCs (Fassin, 2008). SMEs have fewer resources at their disposal (Tilley, 2000), and do not require the same type of bureaucratic management used in large firms to tie together multiple operations (Fassin, 2008). Governance is less systematic in SMEs (Tilley, 2000), and popular EMSs, such as ISO 14001, and EMAS, do not apply as well to SMEs. Similarly, formal EMSs have been found to be harder to adopt (Graafland & Smid, 2016), and have very low adoption rates (Hillary, 2004). Certification for craft breweries should focus on reducing bureaucratic barriers to certification adoption.

Although formal EMSs may be less applicable to SMEs and more difficult to implement, they have been proven to result in improved environmental performance in

some SMEs (Hillary, 2004; Friedman & Miles, 2001). Traditional forms of regulation are also less applicable to SMEs (Graafland & Smid, 2016). Self-regulation may fill a governance gap regarding sustainability topics for craft breweries in Ontario.

One study by Graafland and Smid (2016) reviewed 5,205 SMEs in 12 European countries and found that only 25% of the SMEs included in the study had targets set for environmental improvement. This illustrates a massive potential for CS improvement within SMEs. Simply defining material aspects, and having management targets and goals set for environmental improvement has been proven to significantly improve sustainability performance (Graafland & Smid, 2016; Palmer & Van der Vorst, 1997).

Johnson (2015) identifies that the largest factor influencing SMEs to adopt any type of environmental management tool, is the decision makers' knowledge of that tool. Similarly, Bradford and Fraser (2008) found that the most successful way to improve the adoption of environmental management tools in SMEs is through programs aimed at raising awareness. Trade organizations have been shown to play a very important role to help SMEs overcome challenges regarding implementing environmental management tools, and practices (Roy & Therin, 2008). Roy and Therin (2008) provide evidence that trade organizations can directly address the issues of knowledge, lack of time, and lack of finances within SMEs. The industry association for the craft brewers in Ontario may be the ideal organization to provide leadership for the proposed certification outlined later in this thesis.

SMEs face unique challenges to adopt sustainability certification, and for certification to have a beneficial result. A lack of financial and human resources has been identified as a significant constraint restricting SMEs from successfully adopting certification (Hillary, 2004; International Trade Centre, 2010; Komives & Jackson, 2014; Roy & Therin, 2008; Waide & Bernasconi-Osterwalder, 2008). A lack of financial and human resources may also be a barrier faced by Ontario craft breweries. Komives and Jackson (2014) add that the cost of certification can be prohibitive for SMEs, especially when regulatory compliance is a requirement. Similarly, meeting regulatory compliance for SMEs, in comparison with large firms, has been found to require a larger fraction of overhead costs (Graafland & Smid, 2016). Certification for craft breweries in Ontario should have a very low cost for participating breweries, and focus on performance improvement rather than requiring regulatory compliance. Another barrier to adoption has been found to be the company culture, and company perception towards codes and standards (Hillary, 2004; Sandholtz, 2012). A lack of external support and guidance for SMEs has also been identified as a factor limiting adoption (Hillary, 2004). Leadership from an industry association may provide additional support and guidance for the proposed certification for craft breweries.

Certification schemes have been shown to be improved when organizers emphasize long-term development, and innovation (Mikkila et al., 2009). The use of monitoring mechanisms to measure the effectiveness of certification has been identified to result in performance improvements (ISEAL Alliance, 2010; Schiavi & Solomon, 2007). A higher level

of stringency within a certification scheme is also suggested to result in improved CS performance within SMEs (Waide & Bernasconi-Osterwalder, 2008).

3.7 Similar Research Studies

There have been similar studies conducted that consider industry-specific sustainability certification within industries other than the craft brewing industry. Relevant studies will be reviewed to identify the methods and approach within each, and to substantiate the research methods employed within this research.

Andersson (2016) conducts a study of industry-specific sustainability certification for the event tourism industry in Sweden. Andersson (2016) employs a qualitative method to research. The purpose of Andersson's (2016) research was exploratory. Andersson (2016) had three phases to research. First, interviews were held with 10 representatives administering existing certification schemes within Sweden, and an analysis was done of certification systems found on the internet (Andersson, 2016). The intention of this phase seems to be to identify the relevance of existing certification schemes to the event tourism industry in Sweden. Second, an in-depth interview was held with eight Swedish key informants, such as sustainability consultants and event organization specialists within a focus group (Andersson, 2016). Third, structured interviews were held with 50 event organizations (Andersson, 2016). Andersson (2016) did not identify the total number of questions held within each interview, or the total length of time required for each interview.

Andersson's (2016) research was exploratory in nature, and did not seek to propose a certification scheme, yet simply identify how sustainability may be managed by Swedish event management firms, and identify the need for certification. There are many sustainability certifications available to events companies in Sweden (Andersson, 2016) which likely influenced Andersson's first phase of research. Andersson's (2016) first phase of research is not relevant to this thesis. However, Andersson's (2016) second and third phases of research employ similar methods used within this thesis. Both this thesis, and Andersson's (2016) study hold interviews with key informants, and interviews with industry representatives to gain perspective, and knowledge. Also similarly to this thesis, Andersson's (2016) study is industry specific, and has a defined geographic area.

Delzeit and Holm-Muller (2009) offer research regarding sustainability certification in Brazil's bioethanol industry. The study seeks to identify sustainability indicators that are theoretically relevant, reasonably measurable, and that stakeholders find interesting (Delzeit & Holm-Muller, 2009). Delzeit and Holm-Muller's (2009) research was not aimed at producing a proposal for certification, but to propose a list of relevant sustainability indicators that may be used for certification in the bioethanol industry in Brazil. Delzeit and Holm-Muller (2009) have four distinct phases within their research approach that they identify. First, they collected a large list of possible indicators. This was done by building off two previously existing lists of indicators, and by holding interviews with industry experts (Delzeit & Holm-Muller, 2009). Delzeit and Holm-Muller (2009) amassed 241 potential indicators. In the second phase, Delzeit and Holm-Muller (2009) filtered the 241 potential

indicators according to theory. Overlapping criteria, and criteria that were deemed irrelevant were removed leaving 53 potential indicators (Delzeit & Holm-Muller, 2009). In the third phase, Delzeit and Holm-Muller (2009) further filtered indicators according to the relevance for the users. Further interviews were held in this phase with industry members, and indicators were further filtered (Delzeit & Holm-Muller, 2009). The fourth phase ensured that indicators would be financially reasonable to verify, and resulted in 23 remaining indicators (Delzeit & Holm-Muller, 2009). Delzeit and Holm-Muller (2009) do not identify the number of questions used within each interview, or the span of time taken for each interview.

Delzeit and Holm-Muller's (2009) study, and this thesis both consider industry specific sustainability certification within a defined geography. Delzeit and Holm-Muller (2009) hold interviews with industry experts similar to this thesis. The purpose of Delzeit and Holm-Muller's (2009) study was solely to build an industry specific list of sustainability indicators. This thesis includes a proposed list of sustainability indicators similarly identifying the potential viability of indicators by consulting multiple sources.

3.8 Conclusion

Literature on self-regulation has been reviewed as it may potentially apply to the development of a CS certification scheme in the craft brewing industry in Ontario. Self-regulation has been categorized, and defined. CSR, and CS have been defined, and discussed. EMSs and certification schemes have been defined. Popular codes and standards have been considered. The barriers to adopt codes and standards have been

discussed. The benefits resulting from certification have been reviewed. CS management in SMEs has been reviewed including the factors influencing adoption of certification. Similar research studies have been discussed.

4.0 Literature Review on the Brewing Industry

The brewing industry has been declared to be “one of the world’s most wasteful industries” (Peel, 1999, p. 18). There has been significant growth in the craft brewing industry in Ontario in recent years (Agriculture and Agri-Food Canada, 2017). Notably little research has been done regarding the topics of CSR, CS, and self-regulation in the craft brewing industry (Alonso et al., 2016). Articles have been published considering environmental best-practices, environmental performance and assessment, and CSR reporting relating to the world’s largest beer producers (Peel, 1999; Sloane, 2012; Tokos et al., 2012). There has been significant literature published regarding the historical development of the brewing industry, and the technical aspects involved with beer production. The following research will offer a concise historical description of the emergence of the craft brewing industry. The current state of the industry will be reviewed. Relevant operational components within the craft brewing industry will be identified, and reviewed. Attention will be given to production processes within the focal-firm, and inputs used within production in an effort to identify behaviours potentially impacting CS performance. Materiality will be discussed as it relates to sustainability management in the brewing industry. Finally, best practices regarding sustainability management specific to the craft brewing industry will be considered.

4.1 Background and the Emergence of the Modern Craft Brewing Industry

The scale of consumption and sale of beer has greatly increased over the past 160 years spurred by advances in science and technology allowing improved production

techniques, and establishing production growth (Wilson, 1998). Factors driving the rates of beer production and sales are different from other industries. It is false to assume that increases in beer consumption are directly resulting from broader increases in economic development. The culture surrounding beer, specifically taste and style, are the two major contemporary factors driving an increase in beer consumption per capita (Wilson, 1998). Other factors influencing production and consumption rates include taxation, legislation, and developments in retailing and packaging (Wilson, 1998). In this regard it is important to consider the technological, and socio-cultural factors driving advances in the brewing industry in a historical context, and how they have influenced the current growth of craft breweries.

In the 18th century, brewing was limited to local production and sale (Wilson, 1998). At the turn of the 19th century, the largest breweries in the world were producing a maximum of approximately 240,000 hectoliters per annum (Wilson, 1998). New technologies were introduced that influenced production practice and distribution, and allowed production rates to grow (Wilson, 1998). Steam power, the thermometer, and the hydrometer were all critical inventions allowing an increase in production rates (Wilson, 1998). Rail lines and the steam engine enabled a larger distribution radius for larger scale producers (Wilson, 1998). Germany, Belgium, and England were the prominent beer producing countries of this era. Between 1830 and 1900 Belgium was able to quadruple production levels (Wilson, 1998). The introduction of refrigeration rapidly influenced the production of lagered beer styles within Britain, Germany, Belgium, the U.S., Ireland, and

Denmark between 1850 and 1950 (Wilson, 1998). With the technology to ferment beer at lower temperatures, there was a new found ability to produce lagered beer in larger quantities. Popularity quickly switched from ales to lagers (Wilson, 1998).

As global populations quickly grew during industrialization, so did beer consumption. The growth of beer production levels was not solely a result of population change, and an increased potential market. In Germany, Belgium, and Britain consumption rates per capita grew by 50% during industrialization (Wilson, 1998). Similarly, Table 1 illustrates how per capita consumption grew simultaneously with production rates between 1865 and 1915 in the United States. Not coincidentally, large commercial breweries emerged during the same time period in the United States. Using newly available technology, commercial brewers created lagered beer that has come to dominate the current beer market at a previously impossible scale. Large commercial brewers were able to establish convenient retail outlets, and effective supply chains. By 1890, 90% of production within Germany was done by large commercial breweries almost eliminating the previously dominant microbreweries and brewpubs (Wilson, 1998). Table 2 illustrates the transformation towards large commercial breweries and the simultaneous increase in production rates. Beer production in the early 20th century was altered by the introduction of previously unused ingredients. Many large scale commercial breweries (with the exception of those located in Germany) added rice, maize, and sugars into the brewing process enabling lighter bodied beer to be made in larger quantities for a reduced cost (Wilson, 1998). When used to raise fermentable sugar content rice, corn, maize, and other

sugars that may be processed or unprocessed, are referred to collectively as sugar adjuncts.

Table 1: North American Beer Production Rates, 1865-1915

Year	National Production (millions of hectoliters)
1865	4.3
1870	7.7
1875	11.1
1880	15.6
1885	22.5
1890	32.4
1895	39.4
1900	46.4
1905	58.1
1910	69.9
1915	70.2

(stack, 2010)

Table 2: Number of Breweries, 1865-1915

Year	Number of Breweries
1865	2,252
1870	3,286
1875	2,783
1880	2,741
1885	2,230
1890	2,156
1895	1,771
1900	1,816
1905	1,847
1910	1,568
1915	1,345

(Stack, 2010)

Between 1920 and 1933 prohibition in North America decimated the remaining craft breweries, and enabled established large scale commercial breweries to gain more control of the brewing industry (Stack, 2010). Although the production of alcohol was illegal, there were a few large breweries granted licenses to brew beer for medical purposes. Other large breweries made decisions to produce non-alcoholic beer. The sale of non-alcoholic beer was not commercially successful. Anheuser-Busch was one large commercial brewery that was granted an alcohol brewing license to create real beer, and also produced non-alcoholic beer (Stack, 2010). Almost all smaller breweries shut down during the prohibition years. A select few were able to stay open by making malt syrup for sale as a cooking ingredient (Stack, 2010). Before prohibition, 85% of beer produced was packaged in kegs to be sold to various licensed establishments. Through the production of non-alcoholic beer, the primary method of packaging quickly changed to be 80% bottled (Stack, 2010). The market for non-alcoholic beer was drastically different from real beer. Sales were spread out to include drug stores, grocery stores, and drink stands in North America. As a result, distribution changed drastically. Anheuser-Busch made a large investment in motorized vehicles for distribution (Stack, 2010). As prohibition came to an end, Anheuser-Busch, and a select group of other large scale commercial breweries were positioned to dominate the beer market. Table 3 shows the extent to which prohibition favoured large scale commercial breweries.

Table 3: Number of Breweries and Brewery Size, 1910-1940

Year	Number of Breweries	Average Annual Production (thousands of hectoliters)	Largest Firm's Production (millions of hectoliters)
1910	1,568	45	1.8
1915	1,345	52	1.3
1934	756	58	1.3
1935	766	69	1.3
1936	739	82	1.5
1937	754	91	2.1
1938	700	94	2.5
1939	672	94	2.7
1940	684	94	2.9

(Stack, 2010)

Within five years after prohibition Anheuser-Busch doubled their production output (Stack, 2010). Mass distribution processes came to dominate the beer market. Larger commercial brewers continued to squeeze out the craft brewing industry. Table 4 shows a massive decrease in the overall number of breweries after prohibition. It was not until 1985 that the number of operating breweries in North America stopped falling, and started to grow modestly. Between 1985 and 1990 the number of breweries in the U.S. grew from 105 to 286 (Stack, 2010). Anheuser-Busch InBev is currently the largest beer producer in the world, and accounts for approximately 45% of the market-share in the United States (Forbes, 2017). Similarly, the two largest brewers in Canada, Labatt (under ownership of Anheuser-Busch InBev) and Molson Coors Brewing Company, were responsible for 85% of market-share in Canada in 2012 (Agriculture and Agri-Food Canada, 2016).

Table 4: Number of Breweries, 1945-1980

Year	Number of Breweries
1945	468
1950	407
1955	292
1960	229
1965	197
1970	154
1975	117
1980	101

(Stack, 2010)

4.2 The Craft Brewing Industry

The current state of the craft brewing industry will be reviewed to provide context to relevant topics related to the research question within this thesis. A definition of a craft brewery will be offered, and recent industry statistics will be considered.

4.2.1 Defining a Craft Brewery

A craft brewery is defined by the national craft brewers industry association in the United States as a brewery that produces less than 7 million hectoliters of beer annually, has less than one quarter of its ownership controlled by a non-craft brewing member of the alcoholic beverage industry allowing the firm to be independent, and has a commitment to traditional all-malt brewing (Brewers Association, 2017a). Having a commitment to all-malt brewing is determined by having an all-malt flagship product, or having a minimum of 50% of production volume being either all-malt or using adjuncts to solely enhance characteristics and flavours within the beer (Brewer's Association, 2017a).

Similarly, the Ontario Brewers Association defines a craft brewer as a brewer that produces less than 400,000 hectoliters of beer annually, is independently owned, and only supports traditional production practices (Ontario Brewers Association, 2017c).

The terms, “microbrewery” and “craft brewery” have distinct definitions. Microbreweries are solely defined by the volume of annual beer production. This amount varies provincially, but is set nationally by Beer Canada at a maximum of 250,000 hectoliters of annual beer production (Beer Canada, 2016).

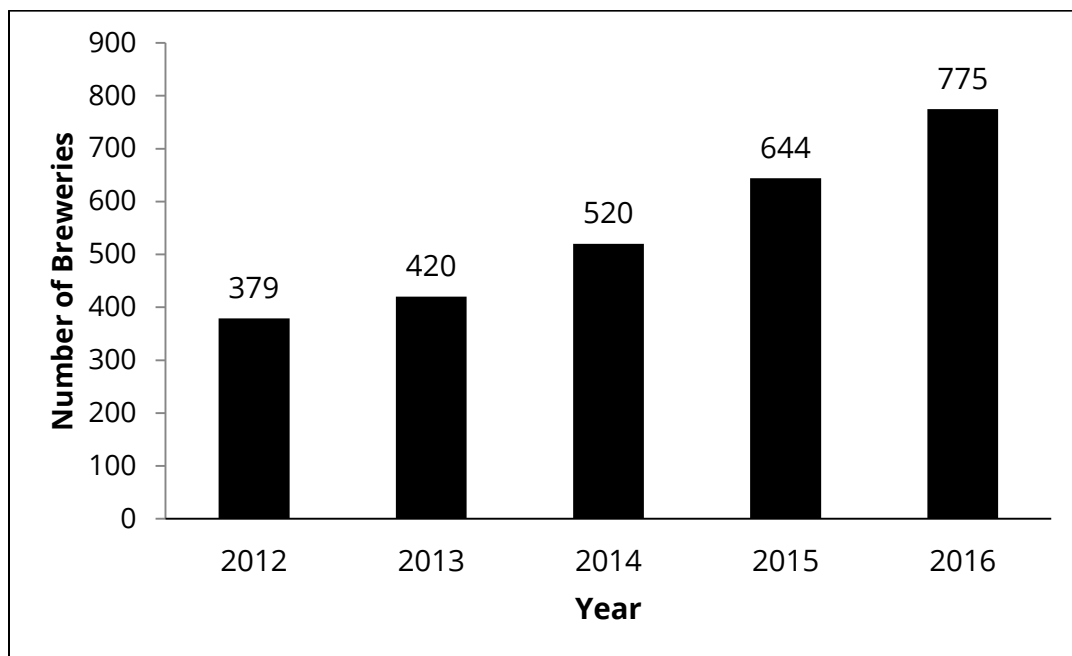
The Ontario Ministry of Finance (2015, p. 6) has offered a definition for “small brewers” within their publication titled, “Master Framework Agreement.” A small brewer is defined by the total production volume, and the source of production. A small brewer must produce less than 400,000 hectoliters of beer within a single year (Ontario Ministry of Finance, 2015). The brewery is also restricted from contracting production from, and to firms that exceed the annual production threshold of 400,000 hectoliters of annual production (Ministry of Finance, 2015).

4.2.2 Current State of the Craft Brewing Industry

There has been significant recent growth within the brewing industry in Canada, and particularly within Ontario in recent years. Beer Canada (2017) reports that in 2016, Ontario held more breweries of all sizes than any other province with 240. The total national production volume in 2012 was 19,548,043 hectoliters, and has fallen to 18,870,832 hectoliters (Beer Canada, 2017), even though the number of operating

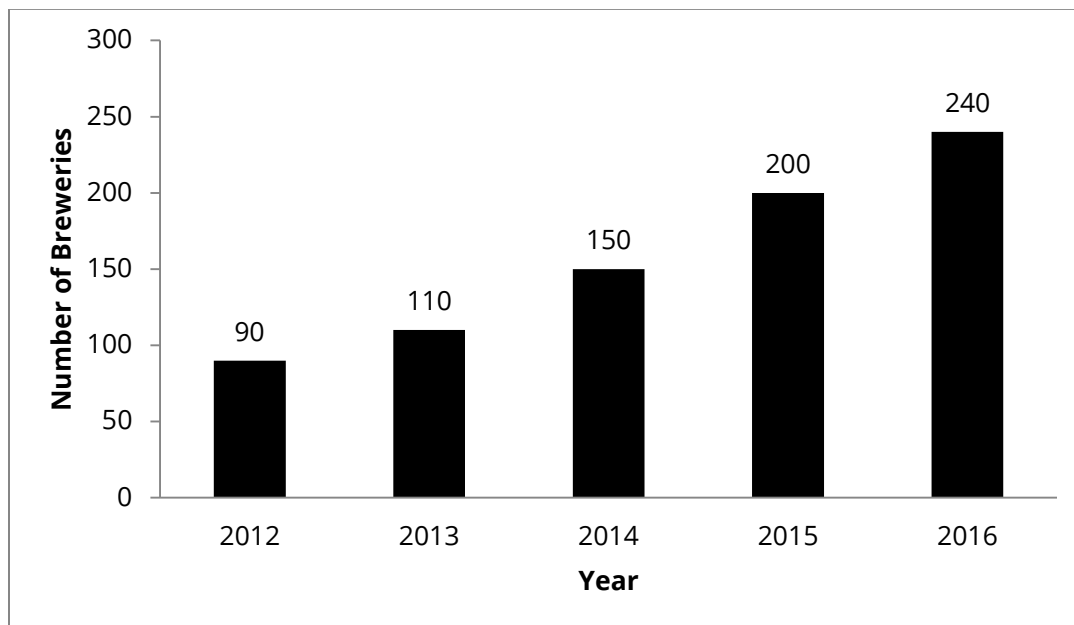
breweries has increased dramatically. Please refer to Table 5 to view the growth between 2012, and 2016 concerning the number of breweries of all sizes operating in Canada. Table 6 illustrates the growth between 2012, and 2016 concerning the number of breweries of all sizes operating in Ontario. Findings suggest the number of breweries will continue to grow in Canada, and that Ontario is establishing a brewing hub. There are more breweries competing for market-share in a national domestic market that is in slow decline.

Table 5: Number of Breweries of All Sizes in Canada



(Beer Canada, 2017)

Table 6: Number of Breweries of All Sizes in Ontario



(Beer Canada, 2017)

The Ontario Ministry of Finance (2017) identifies that there were 283 small breweries operating in Ontario in 2016. Findings by the Ontario Ministry of Finance (2017) do not support findings from Beer Canada (2017). The Ontario Ministry of Finance (2017) identifies 283 small brewers, and Beer Canada (2017) identifies 240 breweries of all sizes. A difference in classification may account for this discrepancy in findings. Small breweries may be classified as craft breweries, contract breweries, and brewpubs (Ontario Craft Brewers, 2017). Although it was not made explicit, Beer Canada (2017) and the Ontario Ministry of Finance (2017) may exclude one or more classifications of breweries identified by the Ontario Craft Brewers (2017). For example, Beer Canada (2017) may only count the number of unique firms with operating production facilities in Ontario, whereas the Ontario Ministry of Finance (2017) may include all contract brewers that do not have a

physical production facility. A contract brewery is a business without a physical production facility that contracts the production of their beer to a brewery with a physical production facility (Ontario Craft Brewers, 2017c). The number of small breweries provided by the Ontario Ministry of Finance (2017) will be trusted within this thesis.

In 2012, the brewing industry supported over 9,000 jobs in Canada, and generated almost \$5 billion in revenue (Agriculture and Agri-Food Canada, 2016). Approximately 90% of all revenue was generated by three large firms (Agriculture and Agri-Food Canada, 2016). Although the total size is much smaller, brewing industry patterns in Canada are very similar to those in the United States. Overall beer sales in the U.S. dropped by 1.3% in 2011, yet craft beer sales rose by 15% (Brewer's Association, 2017). 2011 was not an anomaly, craft beer sales have continued to grow every year for the past 20 years (Brewer's Association, 2017). In the U.S. 250 new craft breweries opened in 2011 complementing the rise of sales to \$8.7 billion from \$7.6 billion in 2010 (Brewer's Association, 2017). Large commercial breweries felt a decline of sales in 2011 accounting for approximately 4 million fewer barrels (Brewer's Association, 2017). The number of craft breweries in the U.S. rose from 8 in 1980 to 537 in 1994 to more than 1600 in 2010 (Brewer's Association, 2017). Although these advances by the craft brewing industry are not insignificant, the craft beer market grew to account for only 9.1% of market share in 2011, and 12.3 % in 2016 (Brewer's Association, 2017). The growth of the number of craft breweries in the United States, and the growth in market-share held by craft breweries in the United States illustrative of the evolving nature of the brewing industry.

Craft breweries in Ontario are located in over 110 communities (Ontario Craft Brewers, 2017e). In 2015, craft breweries held 1,500 jobs within Ontario, and supported 6,000 indirect jobs (Ontario Craft Brewers, 2017d). Craft breweries in Ontario have brought in \$240 million in revenue in 2015, up from \$200 million in 2014 (Ontario Craft Brewers, 2017d). Differing from the Ontario Ministry of Finance, the Ontario Craft Brewers (2017d) identify 210 operating craft breweries and brewpubs in Ontario. The 1,500 jobs identified by the Ontario Craft Brewers (2017d) within 210 breweries suggests a mean employment rate of 7.1 employees per craft brewery. The \$240 million in revenue calculated by the Ontario Craft Brewers (2017d) in 2015 within 210 breweries suggests a mean annual revenue of \$1.1 million per brewery. Data from the Ontario Craft Brewers (2017d) suggest the mean average craft brewery has 7.1 employees with \$1.1 million in revenue. Mesu et al. (2015), and the Organization for Economic Co-operation and Development (2004) identifies that SMEs have less than 250 employees. Statistics Canada defines small businesses by having less than 100 employees (Statistics Canada, 2011). Findings suggest that the mean average craft brewery in Ontario is a very small business with limited human, and financial resources. All the barriers, and influences impacting sustainability management within SMEs previously identified in literature review are directly relevant to craft breweries.

4.3 Operational Components

The brewing production process for craft breweries is based on traditional production methods. Process changes have been introduced within recent years, developed through research and development in food science, that include technologic,

input, and practice changes (Kunze, 1996). Process changes are largely accepted by macrobrewers, and shunned by craft brewers (Appleton, 2016). New inputs recently used by macrobrewers include malt-extract, sugar adjuncts, sulfites, and hop extracts (Briggs, 2004). New practices used by macrobrewers that are not currently used by craft brewers include pasteurization (Briggs, 2004). The production process, inputs, and practices used by macrobrewers are different enough to be irrelevant to the production process of craft breweries in Ontario. Relevant sustainability indicators, and best practices are different between macrobrewers and craft brewers. Comparison of environmental outputs between macrobreweries and craft breweries is inherently unequal. Current academic research regarding lifecycle CS performance within the brewing industry is limited to studies within macrobreweries (Amienyp & Azapagic, 2016), resulting in less relevant performance data. Sustainability indicators must be defined differently between a small craft brewery and a macrobrewery. For the purposes of this thesis, a review of traditional brewing production processes, and inputs will be offered relevant to craft brewers in Ontario.

The four main ingredients used in craft brewing are a grain malt, hops, yeast, and water (Bleier et al., 2013; Briggs, 2004; Hind, 1938; Kunze, 1996). It was not until 1860 that yeast was identified through research by Pasteur, and not until 1870's that yeast was acknowledged as a necessary ingredient (Hind, 1938). The main processes involved in brewing include mashing, boiling, cooling, fermenting, maturing, and packaging (Bleier et al., 2013; Briggs, 2004; Hind, 1938; Kunze, 1996; Ontario Craft Brewers, 2017a; Richardson, 1788). Production may or may not include filtering, and conditioning. Although there may

be other ingredient inputs, such as fruits or coffee, they are not central to craft beer or traditional beer production, and will not be included in the accepted ingredient list.

Ingredient sourcing is an important topic that craft breweries should consider within decision making. Ingredient sourcing can have a very significant influence on the lifecycle sustainability impacts of beer production.

Malting involves steeping grains in water for 48-72 hours at approximately 10-15 degrees Celsius (Olu Malomo, 2011). The grains begin to germinate, activating sought after enzymes (Ontario Craft Brewers, 2017a). Before a seedling begins, germination is halted by drying the grain in a kiln, (Olu Malomo, 2011). Some malt varieties are roasted to establish a specific flavour and colour profile (Ontario Craft Brewers, 2017a). Malting is important to activate enzymes that must split starches and proteins in the mashing phase. Malting is a large industrial process and is usually done by a third party before the grains reach the brewery (Ontario Craft Brewers, 2017a). Grains used for beer malt include barley, wheat, and rye; barley is the most popular (Bleier, 2013; Kunze, 1996).

The first step of brewing is to prepare the malts for the mash. Malted grains are broken up, and crushed by being processed through a mill. The mill grinds the malted grains allowing starches, colours, and flavours to be extracted. The term “grist” is given to ground malt (Bleier, 2013; Briggs, 2004; Kunze, 1996). The mashing process combines grist, and warm water in a container called the mash tun. The enzymes within the malts convert the starches to desirable fermentable sugars, and break apart proteins (Bleier, 2013). The temperature of the mash, and the length of time the mash takes, varies between brewery,

and the type of beer being made. The mash temperature is approximately 65 degrees Celsius, and takes approximately one hour to one and one-half hours (Kunze, 1996). As mash temperatures rise, the quantity of fermentable sugars decreases (USEPA, 1996). The coarseness of the grist, and the temperature of the mash water are both factors contributing to the amount of fermentable sugar able to be extracted during the mash (Bleier, 2013; USEPA, 1996).

After the mash is complete, the liquid is separated from the spent grain malt. The term “wort” refers to the sugary-liquid at this time in the process (Bleier, 2013; Ontario Craft Brewers, 2017a). Depending on the brewery, different equipment may be used in this process; a lauter tun, or straining tank is often used. The purpose of each is to separate the wort from the spent grain malt. The spent grain is no longer of use to the brewery. The wort is now transferred to the brew kettle to begin the next step of brewing (Bleier, 2013; Ontario Craft Brewers, 2017a).

In the brew kettle, wort is brought to a boil (Bleier, 2013). Boiling prevents starches from continuing to convert to sugars, sterilizes the wort, and removes proteins (USEPA, 1996). Hops are now added to the wort. Hops are a female flower of the flora species *humulus lupulus* (Briggs, 2004). Hops provide bittering flavours, aroma, and act as a natural preservative (Ontario Craft Brewers, 2017a). Hops may be added as a whole flower or in pellet-form (Bleier, 2013). The boil lasts between 90 and 120 minutes (Kunze, 1996). After the boil is complete, the hops and other material substances are strained from the wort, and the wort is cooled before being transferred to a fermenting tank (Bleier, 2013).

There is often a heat-exchange that occurs during post-boil cool down. By running wort and cool water side-by-side, the heat-exchange transfers heat energy from the warm wort to clean cool water, and the cool water lowers the temperature of the wort (Briggs, 2004). This suggests that heat exchange, and water recapture after the boil is a business as usual practice, not a project with the designated intention of reduce energy, and water inputs.

Fermentation tanks vary between brewery in size and type. Fermentation tanks are often conical, and may be specific to the type of beer produced (Briggs, 2004). Yeast is added to the wort at approximately 15 degrees Celsius in the fermentation tank (Briggs, 2004). There are many different strains of yeasts; the two main families are top-fermenting yeasts, and bottom-fermenting yeasts (Briggs, 2004). Top yeasts are traditionally used to make ales, in a top-fermenting tank (Briggs, 2004). Bottom yeasts are traditionally used to make lagers in a bottom-fermenting tank (Briggs, 2004). Depending on the quality of the yeast, and the other ingredients being used, yeast may be reused up to 10 times (Olu Malomo, 2011). Fermentation is the process in which yeast converts sugars into ethanol, and carbon dioxide (Briggs, 2004). Uni-tanks ferment, and mature the beer in the same vessel (Briggs, 2004). The temperature of the fermentation tank is very important during fermentation. Depending on the style of beer, temperatures may range from 15-20 degrees Celsius (Briggs, 2004). The higher the temperature, the more active the yeast, and the faster fermentation occurs (Briggs, 2004). Ales are typically produced at higher temperatures, and lagers are typically produced at lower temperatures. Ales are far more popular with craft brewers (Ontario Craft Brewers, 2017b), and lagers are popularly

produced by macrobrewers. Fermentation of a top-fermented ale may take approximately three days, and a lager will take a longer period of time (Briggs, 2004). After fermentation, the liquid product is now considered beer, not wort (Briggs, 2004). A significant amount of energy may be used to cool fermenting tanks during fermentation and maturation. Ales with short fermentation time or less than one week would reasonably be expected to have significantly less energy inputs to cool the tank in comparison with a lager that may take between three and four weeks.

When fermentation is complete, the beer is conditioned, or aged (Briggs, 2004). The beer may be transferred to a tank specifically for conditioning, or may remain in a fermentation tank (Briggs, 2004). Beer may be transferred to a final tank called a bright tank in which the beer is force carbonated, and conditioning is complete (Briggs, 2004). Depending on the style of beer, the product may be packaged directly from the bright tank, or may be filtered to remove yeast (Briggs, 2004). The inclusion of yeast within the final product may be desirable, or undesirable depending on the beer style. The total time between mashing, and packaging is highly dependent on beer style, and may take between 6 and 40 days (Briggs: 2004; Olu Malomo, 2011). Such a significant difference between production times is expected to result in differences regarding energy inputs for within the focal firm.

The final step is to package the beer. Packaging may be done into a keg, cask, barrel, bottle, growler, or can. Packaging in reusable glass bottles is the popular container choice for macrobrewers in Canada. Macrobrewers in Ontario recover, rinse, sterilize, and re-use

more than 90% of the bottles within circulation (The Beer Store, 2017). Craft brewers in Ontario generally prefer to package in cans (Ontario Craft Brewers, 2017b). Packaging equipment has a very vast range in size, and efficiency (Briggs, 2004). Cans are quickly becoming the packaging option of choice for Canadian beer consumers (Beer Canada, 2017). Although the reusability of bottles may seemingly be an environmentally responsible decision, there may be significant environmental impacts during bottle cleaning, and primary production. Cans are readily recyclable, and impose far less energy inputs, and global warming potential in comparison to bottles regarding primary production, cooling, and transportation (Amienya & Azapagic, 2016). After packaging, the product is ready for sale, and delivery.

There are additional inputs used within the production process that have not yet been identified, and are important to note. Carbon dioxide is purchased and used to force-carbonate product, and to move product (Peel, 1999). Diatomaceous earth is purchased and used during filtering (Tokos et al., 2012). Glycol and other refrigerants are used in a cold room, and throughout the fermentation process. Natural gas is often used in a boiler room, and to provide heat during brewing. Other material inputs are used during packaging and distribution such as bottle caps, and plastic wrap. Gasoline is used for vehicles during distribution. Chemical agents are used for cleaning, and disinfecting throughout the Brewhouse (Peel, 1999).

4.4 Sustainability Management in the Craft Brewing Industry

There is little academic literature published regarding CS management practices in the craft brewing industry (Alonso et al., 2016). Some data may be attainable through industry-led initiatives that have led to sharing, and publishing information relating to best-practices for managing sustainability (Brewers Association, 2014a; Brewers Association, 2014b; Brewers Association, 2014c). Topics relating to sustainability management, such as material sourcing and water quality, have been identified as RBV resource attributes in the craft brewing industry (Duarte, Bressan & Sakallarios, 2016). A lack of financial resources with the craft brewing industry has been identified as a RBV weakness (Duarte, Bressan, & Sakallarios, 2016). Literature has been reviewed with the interest of understanding further management practices, impacts, and sustainability indicators with an RBV lens.

4.4.1 Materiality

Materiality is a very important concept to address when considering sustainability management, and reporting. Jones, Comfort, and Hillier (2015, p. 82) write, “Materiality is concerned with identifying those environmental, social and economic issues that matter most to a company and its stakeholders.” The scope of this thesis will not consider additional stakeholder interests relating to specific indicators. Suggestions for future research will include the need to have additional stakeholder input on the proposed indicators. Nevertheless, an initial list of proposed indicators will be presented within this thesis. A review of literature relating to materiality that may be relevant to craft breweries in Ontario will be completed.

There are two notable studies regarding materiality in the brewing industry that are not specific to craft brewers, or small brewers. The first is a study by Peel (1999) concerning CS in the brewing industry that presented a list of environmental indicators. The second study by Tokos et al. (2012) proposes a composite sustainability index for breweries that categorizes environmental, economic, and social performance, and also presents the results of a performance assessment. There are several indicators that have emerged and are suggested to be relevant. Multiple aspects, and indicators identified in Appendix 1 have been suggested by Peel (1999). Aspects identified by Peel (1999) include malt, hops, water, energy, packaging materials, solid wastes, liquid wastes, and gaseous wastes. Tokos et al. (2012) propose a list of indicators relevant to the brewing industry that are compatible with indicators suggested by the Global Reporting Initiative. Tokos et al. (2012) proposed a list of 49 indicators that relevant to the brewing industry. Tokos et al. (2012) grouped indicators into the three categories of environment, society, and economy. Environmental aspects include materials, energy, emissions, effluents, and waste (Tokos et al., 2012). Social aspects include employment, occupational health and safety, and diversity and equal opportunity (Tokos et al., 2012). Eight economic aspects were identified by Tokos et al. (2012). Appendix 1 includes indicators identified by Tokos et al. (2012).

Roca and Searcy (2012) review Canadian corporate sustainability reports and analyse the indicators that are popularly reported. Roca and Searcy (2012) review reports from 94 Canadian firms, and cross-reference them with GRI indicators. Roca and Searcy (2012) list the most popular GRI indicators reported by Canadian firms. Popular indicators

include the total number of employees, water consumption, energy consumption, and environmental spills (Roca & Searcy, 2012). Indicators listed by Roca and Searcy (2012) are referenced in Appendix 1.

Economic indicators will not be included within this research because they are not deemed relevant to achieve the goal of certification. The definition of a craft brewer requires independent ownership (Brewers Association, 2017a), and shuns publicly traded corporations. Corporate financial reporting is largely driven by investor concerns (Dichev, 2017). Small, independent craft breweries may not have an interest to attract outside investors through publicly reporting financial information, and financial disclosures will not be considered for that reason.

Appendix 1 compiles a list of 70 potentially relevant environmental and social indicators to the craft brewing industry in Ontario. Further input from a variety of stakeholders will be suggested within the suggestions for future research in this thesis.

4.4.2 Sustainability Impacts in the Ontario Craft Brewing Industry

There are multiple environmental and social impacts originating from the brewing industry. Materiality has been discussed, and social and environmental indicators relating to craft breweries are proposed in Appendix 1. The impacts resulting from social and environmental aspects are important to consider to provide additional context to the challenges faced by breweries to improve sustainability performance.

Environmental aspects include water inputs (Fillaudeau et al., 2016; Olajire, 2012; Peel, 1999; Sierra Nevada, 2015; Tokos et al., 2012), energy inputs (Olajire, 2012; Tokos et al., 2012), greenhouse gas emissions (Olajire, 2012; Tokos et al., 2012), solid waste outputs (Olajire, 2012), and wastewater outputs (Olajire, 2012). Each of these environmental aspects may be quantified to identify the impacts associated with each aspect. Statistics published by the national brewing industry association in Canada (Beer Canada), and the provincial industry association for craft breweries (Ontario Craft Brewers) will be used to calculate impacts resulting from Ontario craft breweries. Beer Canada (2017) identifies that total domestic beer production volume from all sizes of breweries in Ontario in 2016 to be 6,426,110 hectoliters. Ontario Craft Brewers (2017d) identifies that craft brewers in Ontario account for 6% of the total domestic production volume. Based on statistics from Beer Canada (2017) and the Ontario Craft Brewers (2017d), craft breweries in Ontario will be expected to have produced 385,567 hectoliters of beer in 2016. Calculations regarding environmental impacts will be based on craft breweries in Ontario producing 385,587 hectoliters of beer.

Total water use is a significant environmental aspect within the brewing industry. Efficiency ratios of water used within brewing production processes in the focal firm have been calculated to be 4.9 hectoliters of water used per hectoliter of beer produced for an efficient production process (Olajire, 2012). Fillaudeau et al. (2006) identify that the range of water output within a brewing facility is between 4 hectoliters of water used per hectoliter of beer produced and 11 hectoliter of water used per hectoliter of beer produced. This

suggests that the craft brewing industry in Ontario uses between 1.5 million hectoliters, and 4.2 million hectoliters of water within the production process alone. Amienyo and Azapagic (2016) identify that producing a single hectoliter of beer requires between 41.2 and 41.8 hectoliters of water throughout the lifecycle. Expanding on Amienyo and Azapagic's (2016) findings the Ontario craft brewing industry may be responsible for using between 15.9 million hectoliters and 16.1 million hectoliters of water in 2016 throughout the product's lifecycle.

Energy use within the brewing industry is a significant environmental aspect (Olajire, 2012; Tokos et al., 2012). Olajire (2012) declares that an efficient brewery would use 150 MJ of fuel energy within the production process to produce one hectoliter of beer. Amienyo and Azapagic (2016) found that it takes between 1,030 and 1,750 MJ of energy to produce a single hectoliter of beer throughout the entire lifecycle. Expanding on Olajire's (2012) findings, the Ontario craft brewing industry may have used approximately 57.8 million MJ of energy within 2016. Expanding on Amienyo and Azapagic's (2016) findings the brewing industry in Ontario may be responsible for using between 397 MJ and 675 MJ of energy throughout the production lifecycle in 2016.

Greenhouse gas emissions have been identified as a significant environmental aspect within the brewing industry (Olajire, 2012; Tokos et al., 2012). Olajire (2012) identifies that 19 kg of CO₂-e is generated for every hectoliter of beer produced within the production process. Amienyo and Azapagic (2016) found that between 51 kg and 84.2 kg of CO₂-e emissions are generated per hectoliter of beer throughout the product's lifecycle.

Expanding on Olajire's (2012) findings, the Ontario craft brewing industry may have generated 7.3 million kg of CO₂-e in 2016. Expanding on Amienyo and Azapagic's (2016) findings, the Ontario craft brewing industry may have been responsible for between 19.7 million kg and 32.5 million kg of CO₂-e emissions in 2016.

Solid waste outputs have been identified as a significant environmental aspect within the brewing industry (Olajire, 2012). Olajire (2012) identifies that beer production is responsible for producing 5.1 kg of solid waste for every hectoliter of beer produced. Olajire's (2012) findings suggest that the Ontario craft brewing industry may have been responsible for producing approximately 2 million kg of solid waste in 2016.

Wastewater outputs have been identified as a significant environmental aspect within the brewing industry (Olajire, 2012). The wastewater to beer ratio is 1.3 hectoliters to 1.8 hectoliters less than the water to beer ratio (Olajire, 2012). Fillaudeau et al. (2006) identifies the water to beer ratio to be between 4 hectoliters and 11 hectoliters of water for every hectoliter of beer produced. Based on Olajire (2012) and Fillaudeau et al.'s (2006) findings, the Ontario craft brewing industry may be responsible for between 848,247 hectoliters and 3.7 million hectoliters of wastewater emissions in 2016. Significant characteristics of wastewater include pH, chemical oxygen demand, total nitrogen, and suspended solids (Olajire, 2012). Ph may range from 6.1 to 6.9 (Olajire, 2012). Chemical oxygen demand may range between 1150 mg and 1350 mg per liter of wastewater (Olajire, 2012). Total nitrogen may range between 21 mg and 27 mg per liter of wastewater (Olajire, 2012). Suspended solids may range between 450 mg and 550 mg per liter of wastewater

(Olajire, 2012). Expanding on Olajire's (2012) findings, the Ontario craft brewing industry may be responsible for as much as 52,051 kg of chemical oxygen demand, 1,041 kg of total nitrogen, and 21,206 kg of suspended solids within wastewater emissions in 2016.

Social aspects relevant to the brewing industry include the local communities affected by production (Olajire, 2012), and the employees impacted by each brewery (Tokos et al., 2012). Craft breweries in Ontario directly impact 110 different communities, and 1,500 employees (Ontario Craft Brewers, 2017d). Material indicators relating to local communities, and employees are proposed in Appendix 1.

4.4.3 Projects and Best Practices

Literature relating to projects and best practices that may be applicable to improve sustainability performance in the craft brewing industry will be reviewed. Literature specific to the projects and best practices for craft brewers and small brewers is scarce, but is still worth reviewing to identify potentially relevant topics.

Cooper (2014) identifies that through the Brewers Association supporting a technical committee to build sustainability management tools, they directly address the need to offer small brewers the resources they require to build better sustainability management practices. Cooper (2014) accurately addresses the resource barrier faced by small brewers to create their own sustainability management tools, and identifies the need from small brewers to be given the right tools, and information to properly manage

sustainability within their own firms. Involving the Ontario Craft Brewers Association within a leadership role may similarly provide benefits to the craft brewing industry in Ontario.

Herold et al. (2016) provides insight into the popular sustainability management trends within Australia employed by craft breweries. Herold et al. (2016) identify that sustainability measurement is lacking within the craft brewing industry in Australia. Regarding water use, Herold et al. (2016) found that simply installing water meters had a significant impact on the efficiency of water use within breweries. This finding suggests the concept of information inductance has had tangible effects in the craft brewing industry. Simply by installing water meters, and monitoring water use, Herold et al. (2016) found improved performance. Other tangible practices to reduce water use are to reduce water pressure during cleaning (Herold et al., 2016), and to recover water used after the boil, during cool down (Olajire, 2012). Installing water meters, reducing water pressure for cleaning, and recovering water after the boil should all be applicable to craft breweries in Ontario.

Simply by conserving the resources used within the production process, and recycling inputs, brewers may significantly reduce waste output (Herold et al. 2016). Donating spent grain to local farms, and processing wastewater with anaerobic digestion have been significant factors to reduce total waste output, and improve wastewater (Herold et al., 2016). Other tangible practices to reduce inputs include modifying mash filters, and making strategic decisions regarding packaging type (Herold et al., 2016). Herold et al. (2016) accurately identifies that strategic decisions will improve performance.

Including sustainability considerations within supply chain decision making, or strategic product development decisions may have significant positive results for Ontario craft breweries.

Conserving energy, and analysing energy sources may result in energy performance improvement within craft breweries (Herold et al., 2016). Sourcing inputs from local suppliers, and selling to local markets reduces energy used during transportation. High-efficiency lighting, heating, and cooling systems significantly reduce energy needs within the brewhouse (Herold et al., 2016). Establishing appropriate data management has been identified as a key piece to improving energy performance (Brewers Association, 2014c). Tracking energy data, and considering sourcing options are both practices that Ontario craft breweries may be able to apply.

Academic literature regarding the best practices for managing sustainability in the craft brewing industry is severely lacking. The general focus is on environmental aspects, specifically energy, water, and waste. The literature does not appropriately consider social aspects involved with craft brewing operations. The concepts of data management (Brewers Association, 2014a; Brewers Association, 2014b; Brewers Association 2014c; Herold et al., 2016), and information sharing (Cooper, 2014) have emerged as significant to this thesis.

4.5 Conclusion

The historical background concerning the emergence of the craft brewing industry has been reviewed within this chapter. The current state of the brewing industry has been reviewed providing context for the current interest in self-regulation. The operational components within the craft brewing industry, including production processes and inputs have been reviewed. Literature concerning materiality was reviewed, and specific impacts have been identified. Finally, publications relating to the best practices and improvement projects in the craft brewing industry have been considered in this chapter as they may relate to the proposal presented later in this thesis.

5.0 Content Analyses

Two separate content analyses were performed in an effort to help understand existing sustainability certifications available to craft breweries in Ontario, and to understand existing practices employed by sustainability leaders within the craft brewing industry. Content analysis is a research method that reviews media in a systematic way to analyse informative data (Bos & Tarnai, 1999). The first content analysis is quantitative and reviews existing standards, and certification schemes for their relevance to improve performance within the craft brewing industry in Ontario. The second content analysis is qualitative, and considers public communications from two breweries recognized for sustainability leadership. The second content analysis was inductive, and sought to uncover relevant information relating to sustainability indicators, and improvement projects relevant to craft breweries. The methods, process, and results of each content analyses will be discussed.

4.1 Quantitative Content Analysis of Existing Standards and Codes

There is a wide variety of existing sustainability-related certification schemes that are organized differently, with different content, different requirements, and cater to different firms. In an effort to understand the applicability of existing certification schemes to the Ontario craft brewing industry a simple quantitative content analysis was completed. Analysis was completed with the goal of finding if there are any enterprise sustainability certification schemes that consider performance, and cater to the craft brewing industry. The findings will be discussed.

An index of standards, certification schemes, codes, and ecolabels has been compiled by Big Room (2017a). The directory contains 465 unique schemes that are offered within 199 different countries (Big Room, 2017a). Big Room (2017b) is a sustainability consulting firm that offers the largest publically available directory of ecolabels in the world. Big Room structures and compiles data on existing ecolabels allowing the reader to easily access information on the content and requirements of each ecolabel. There are other compilations of ecolabels and standards, such as the list created by the United Nations Environmental Programme (2009), and the Global Ecolabelling Network (2017). The directory created by Big Room was chosen because of Big Room's previous work to categorize ecolabels (Big Room & World Resources Institute, 2010), the breadth of standards included within the directory, and the quality of the structured display of data.

Categories were made to analyse the 465 unique schemes. The first category considered if the 465 schemes would meet the following criteria: schemes must be available in English, in Ontario potentially relevant to craft breweries. The majority of schemes did not fit into this category. The remaining 64 schemes were analysed quantitatively by considering the following five categories: 1) Total number of performance-related schemes; 2) Total number of performance related schemes for a single aspect; 3) Total number of product related schemes that are not performance-based; 4) Total number of schemes that consider enterprise sustainability relevant to the Ontario craft brewing industry; 5) Total number of schemes that do not fit any other category.

From the total 465 schemes, 64 codes or standards were found to be available in English, available in Ontario, and potentially applicable to craft breweries. Six additional categories were considered for the remaining 64 schemes. Five schemes were found consider sustainability performance limited to aspects within the focal firm. 25 schemes were found that considered the sustainability performance of a single aspect, such as carbon-neutrality. Nine schemes were found to be limited in scope to a single product. Zero certification schemes were found that considered enterprise sustainability certification relevant to the craft brewing industry in Ontario. 25 certification schemes were found that do not fit into any of the previous 5 categories. Please refer to Appendix 2 for additional information.

Content analysis revealed that there are no existing sustainability-related certification schemes, standards, or codes within the global index created by Big Room (2017a) that focus on improving enterprise sustainability performance relevant to the craft brewing industry in Ontario. This is an important finding that supports the thesis question, suggests applicability for the certification scheme proposal provided later in this thesis.

5.1.1 Results from Quantitative Content Analysis of Existing Standards and Codes

Quantitative content analysis was performed with the goal of identifying if there is an existing sustainability certification scheme that considers enterprise aspects and performance that may be applicable to craft breweries in Ontario. An index of sustainability-related standards, codes, and certification schemes was considered that was compiled by Big Room (2017a). The index contains 465 unique schemes (Big Room, 2017a).

Several categories were created to analyse the 465 schemes. The first category identified the total number of schemes that were available in English, in Ontario and potentially relevant to craft breweries. Schemes that were not available in English, or were only applicable for specified geographic locations did not fit this category. 64 schemes fit this category.

The 64 schemes that fit the first category, were further categorized within the following six categories: 1) Total number of performance-related schemes; 2) Total number of performance related schemes for a single aspect; 3) Total number of product related schemes that are not performance-based; 5) Total number of schemes that consider enterprise sustainability relevant to the Ontario craft brewing industry; 6) Total number of schemes that do not fit any other category.

The results find that schemes consider sustainability performance limited to aspects within the focal firm (Big Room, 2017a). 25 Schemes consider sustainability performance of a single aspect (Big Room, 2017a). Nine schemes are limited to a single product (Big Room, 2017a). There are no schemes that consider enterprise sustainability certification relevant to the craft brewing industry in Ontario (Big Room, 2017a). 25 schemes did not fit into any other category. Schemes that did not fit into any other category considered topics such as vegan certification (Big Room, 2017a). The results are summarized in Table 7 below, and detailed results are found in Appendix 2.

Table 7: Summary of Quantitative Content Analysis

Categories	Quantity
Total number of schemes	465
Potentially industry-relevant schemes	64
Performance-related schemes	5
Performance related schemes for a single aspect	25
Product related Schemes	9
Other certifications	25
Total enterprise sustainability certifications relevant to the craft brewing industry in Ontario	0

It is pertinent to note that the results within this quantitative content analysis identify that there are no certification schemes available that are relevant to craft breweries. Findings suggest that establishing a viable certification scheme for craft breweries in Ontario may fill a gap in the existing standards, codes, and certification schemes.

5.2 Qualitative Content Analysis of Two Leading Craft Breweries

Content analysis was performed on two craft breweries identified as sustainability leaders. Content analysis will help bring understanding to some of the sustainability-related content publicly communicated by industry leaders. Qualitative, inductive content analysis will focus on information publicly communicated by two industry leaders through reports published on their websites. Analysis will be conceptual and will aim to find emerging themes (Wilson, 2016). Themes are expected to emerge throughout analysis, and will be categorized.

Two breweries were identified meeting the following selection criteria: 1) The brewery must be defined as a craft brewery and must publically present a report through the company website that includes sustainability-related information; 2) The brewery must be acknowledge as a sustainability leader by receiving an award from a third-party endorsing the brewery's sustainability management efforts. Content within the reports published by each brewery have been analysed.

5.2.1 Sierra Nevada

Sierra Nevada is the third largest craft brewery in the United States (Brewers Association, 2017b), and has multiple facilities (Sierra Nevada, 2015). Sierra Nevada received a 2016 sustainability excellence in manufacturing award from the OpX Leadership Network for their excellence within their sustainability program (OpX Leadership Network, 2017). Sierra Nevada is acknowledged as an industry leader by the OpX Leadership Network and will be included within research for that reason. Sierra Nevada offers a Sustainability report that will be analysed to find prominent emerging trends relating to significant sustainability indicators, reporting practices, and relevant improvement projects.

Sierra Nevada starts the report with a message from the top-level decision maker regarding a commitment to sustainability management (Sierra Nevada, 2015). The report includes a page reflecting on the company itself, and how it has developed (Sierra Nevada, 2015). The representatives responsible for managing sustainability are introduced, and a statement is given establishing a commitment to minimize sustainability impacts, and balance environmental, social, and economic concerns (Sierra Nevada, 2015). There is a

goal declared to work towards zero solid waste (Sierra Nevada, 2015). A closed loop approach is identified, and is declared to be an influence during product design (Sierra Nevada, 2015). Influences to reduce waste are described to be an improvement to environmental health, and to reduce resource costs (Sierra Nevada, 2015). The percentage of waste diverted is identified, the avenues for waste diversion are listed (Sierra Nevada, 2015). Waste is diverted through reuse, recycling, and composting (Sierra Nevada, 2015). Waste audits are held, and metrics are tracked and communicated to employees (Sierra Nevada, 2015).

A LEED certification is declared (Sierra Nevada, 2015). Ingredient sourcing is identified as being influenced by sustainability topics (Sierra Nevada, 2015). Partnerships with ingredient suppliers are identified (Sierra Nevada, 2015). The brewery identifies the ownership and management of an organic vegetable garden (Sierra Nevada, 2015). Wildlife is identified as an important topic (Sierra Nevada, 2015). Reforestation efforts within a local forest are referenced (Sierra Nevada, 2015).

Energy is identified as an important indicator. Total annual energy use, and total renewable energy production is reported (Sierra Nevada, 2015). Energy efficiency ratio is reported with respect to per volume production (Sierra Nevada, 2015). Renewable projects include solar, and biogas through anaerobic wastewater treatment (Sierra Nevada, 2015). Energy efficiency project referenced include automation, lighting upgrades, employee training, variable speed drives on pumps, and heat recovery (Sierra Nevada, 2015).

Water is identified as an important indicator (Sierra Nevada, 2015). Water efficiency ratios are disclosed with annual rolling metrics (Sierra Nevada, 2015). Projects were identified aimed at water reduction including the use of non-water-based lubricants, automating a clean in place system, drip irrigation, recovering water after cool-down, removing grass lawns, and checking water leaks (Sierra Nevada, 2015). There is a description of storm water management efforts (Sierra Nevada, 2015). Sierra Nevada identifies their on-site wastewater pre-treatment practice (Sierra Nevada, 2015). New packaging types have been introduced to reduce input-materials, and reduce shipping weight (Sierra Nevada, 2015). Waste reduction, and re-use practices are identified a certification for zero-waste is declared (Sierra Nevada, 2015).

Transportation and carbon emissions are identified as important indicators (Sierra Nevada, 2015). Drag-reducing mud flaps and speed governors are identified as projects that reduce emissions within transportation (Sierra Nevada, 2015). Other transportation-related projects are identified, including electric car charging stations on-site, and encouraging cycling (Sierra Nevada, 2015). Employee education regarding sustainability topics is introduced (Sierra Nevada, 2015). Employee programs aimed at promoting healthy lifestyles are defined (Sierra Nevada, 2015). A statement is given for employee safety (Sierra Nevada, 2015). Commitment to local communities are declared including cleaning litter from highways, and rivers (Sierra Nevada, 2015). Sponsorships and partnerships for local events and organizations are identified (Sierra Nevada, 2015).

Sierra Nevada identifies that they co-chair a sustainability committee with the national industry association (Sierra Nevada, 2015). Sierra Nevada does not identify whether or not all regulatory requirements are met. Sierra Nevada's 28 page biennial sustainability report ended with closing remarks (Sierra Nevada, 2015).

5.2.2 Deschutes Brewery

Deschutes Brewery is the 8th largest craft brewery in the United States (Brewers Association, 2017b). Deschutes has been awarded by the Business Intelligence Network as a sustainability leader in 2016 (Business Intelligence Network, 2017). Deschutes has also been awarded a Sustainability Award by the Governor of Oregon in 2015 (Business Oregon, 2015). Deschutes will be considered a sustainability leader because of these awards. The Deschutes website, and sustainability report will be analyzed for information regarding relevant sustainability indicators, content, and best practices.

Deschutes Brewer publicly communicates sustainability-related information through their website in the form of a two-page sustainability report reviewing performance, and data from the previous year (Deschutes Brewery, 2015). Deschutes references accomplishments relating to the community, environment, and business (Deschutes Brewery, 2015). Deschutes references winning a sustainability award with the state of Oregon, and another sustainability award with the city of Portland (Deschutes Brewery, 2015). The total amount of renewable energy purchase was disclosed (Deschutes Brewery, 2015). The fraction of energy saved comparing to the previous year is disclosed (Deschutes

Brewery, 2015). An energy reduction project to replace existing lighting with energy-efficient lighting is identified (Deschutes Brewery, 2015).

The total weight of recycling is disclosed (Deschutes Brewery, 2015). A corporate wellness program is referenced (Deschutes Brewery, 2015). Deschutes identifies that the co-owners are the relevant decision makers, and a commitment to sustainability management is given (Deschutes Brewery, 2015). Commitments to local communities are disclosed, including charitable donations, and waste-cleaning events (Deschutes Brewery, 2015).

A commitment to river conservation, and health is given (Deschutes Brewery, 2015). Deschutes identifies that they support two separate organizations that are responsible for river conservation (Deschutes Brewery, 2015). Suppliers are mentioned through identifying a preferred ingredient supplier (Deschutes Brewery, 2015). Deschutes identifies that they track water, electricity, gas, waste, and renewable energy (Deschutes Brewery, 2015). Deschutes' report ends with a commitment to local communities, and suppliers (Deschutes Brewery, 2015). Deschutes identified indicators, but did not disclose performance metrics. Deschutes (2015) did not identify if regulatory compliance is met.

5.2.3 Results of Qualitative Content Analysis on Two Craft Breweries

A qualitative content analysis was performed on two craft breweries. Both Deschutes Brewery and Sierra Nevada are among the largest craft breweries in the United States (Brewers Association, 2017b). Both breweries are recognized sustainability leaders

within the craft brewing industry, and offer public reports with sustainability-related data through their respective websites. They have both received awards from third parties recognizing their commitment, and excellence regarding sustainability management. Publicly communicated data from both breweries' websites has been reviewed to identify the content within sustainability reports given by industry leaders, and to identify industry best-practices. The information collected can be organized by creating the following categories: 1) organization of communications, 2) indicators and commitments disclosed, 3) Projects Disclosed.

5.2.3.1 Organization of Communications

The structure and organization of each breweries' report was completely different. Deschutes Brewery (2015) offered a two page document that generally focused on communicating sustainability-related accomplishments from the past year. Sierra Nevada (2015) provided a 28 page document Analysing performance, and identifying projects and commitments. Sierra Nevada (2015) offered more in-depth information, and more specific information compared to Deschutes Brewery (2015).

5.2.3.2 Indicators and Commitments Disclosed

Despite the significant differences between the breadth and quality of each firms' publicly communicated sustainability data, there were noticeable similarities that emerged. Both breweries identified the following significant sustainability indicators: energy, solid waste, and water (Deschutes Brewery, 2015; Sierra Nevada, 2015). The content within

Sierra Nevada's (2015) public communication was far more in-depth than that of Deschutes Brewery (2015). Sierra Nevada (2015) identifies wastewater, air emissions and transportation as significant environmental indicators that were not included within Deschutes Brewery (2015) communications. Sierra Nevada (2015) also offered much more specific data for aspects that were reported on. Total values, and efficiency ratios were offered for water, air emissions, waste, and energy (Sierra Nevada, 2015). Both breweries identified commitments to local communities, and to employee welfare (Deschutes Brewery, 2015; Sierra Nevada, 2015). Both breweries communicated commitments to sustainability from top level decision makers (Deschutes Brewery, 2015; Sierra Nevada, 2015). Neither brewery made a clear reference to whether or not regulatory compliance has been achieved (Deschutes Brewery, 2015; Sierra Nevada, 2015).

5.2.3.3 Projects Disclosed

Both breweries identified multiple projects to support local communities, employees, and environmental performance (Deschutes Brewery, 2015; Sierra Nevada, 2015). Both breweries identified projects in place to improve the amount of renewable energy used (Deschutes Brewery, 2015; Sierra Nevada, 2015). Both breweries identified projects to replace existing lighting with more energy efficient lighting (Deschutes Brewery, 2015; Sierra Nevada, 2015). Both breweries identified projects, and partnerships established to support local community charitable organizations and conservation organizations (Deschutes Brewery, 2015; Sierra Nevada, 2015). Both breweries identified an employee-managed project to clean litter within public spaces in the local community

(Deschutes Brewery, 2015; Sierra Nevada, 2015). Sierra Nevada (2015) identified more specific projects used to improve performance. Sierra Nevada (2015) identified solar installations, and biogas-fueled microturbines in place to produce renewable energy. Energy efficiency projects identified by Sierra Nevada (2015) include increasing automation, installing variable speed drives on all pumps, building awareness with staff, heat recovery during the boil, and installing a thermal energy storage tank to hold excess heat energy. Projects established to improve water-use include the use of waterless lubricants, automating the clean-in-place process, establishing drip irrigation in the onsite garden, heating water on-demand, and saving water after cool-down (Sierra Nevada, 2015). Wastewater is treated with an anaerobic sequencing batch reactor (Sierra Nevada, 2015). Wrap-around style packaging is used to reduce packaging material (Sierra Nevada, 2015). Malt is shipped by train (Sierra Nevada, 2015). Packaging material is re-used when possible (Sierra Nevada, 2015). Broken pallets are mended for re-use (Sierra Nevada, 2015). Additional packaging material is donated to local organizations (Sierra Nevada, 2015). Biodiesel is produced from used vegetable oil (Sierra Nevada, 2015). Charging stations are installed on-site to promote the use of electric vehicles (Sierra Nevada, 2015). Installation of bicycle maintenance stations on-site (Sierra Nevada, 2015).

Sierra Nevada (2015) and Deschutes Brewery (2015) are both sustainability leaders within the craft brewing industry in the United States. Public communications found through each firms' website suggest significant differences in the quality, and content of sustainability data reported in the craft brewing industry. Public communications also offer

insight into the organization of publicly communicated information, important sustainability indicators and commitments, and projects implemented to support improvement (Deschutes Brewery, 2015; Sierra Nevada, 2015).

5.3 Conclusion

. Research results within this chapter have communicated significant emerging concepts regarding potentially relevant sustainability indicators, and content to include within a sustainability certification scheme for Craft breweries in Ontario. The results within this chapter and emerging themes within the literature review will be used to substantiate the content within the proposed certification scheme presented in this thesis.

6.0 Methodology

This chapter will examine the research approach and methods employed to determine the appropriate elements within, and construction of a sustainability certification scheme proposal for the Ontario craft brewing industry. The chapter will review the purpose of the study, the objectives of the study, research methods within the study, the approach used within the study, and limitations to research.

6.1 Research Question

The thesis question considered reads as follows: what is a viable model for a self-regulatory sustainability certification scheme for Ontario-based small brewers? Research will be inductive in an attempt to find emerging concepts that will help answer the research question. The study will examine the appropriate content, and organization of a sustainability certification scheme that may improve sustainability performance within the craft brewing industry in Ontario.

6.2 Purpose and Objectives

The purpose of this study is to explore sustainability certification as a potential self-regulatory mechanism for application in the craft brewing industry in Ontario. The study will build on existing literature regarding self-regulation and governance theory. The body of literature concerning the benefits, and evaluating the effectiveness of CS certification, codes, and standards is robust (Blackman & Rivera, 2011; Mori et al., 2016). Research is starting to be directed towards industry-specific CS certification, such as in the seafood industry (Kvalvik, Noestvold, & Young, 2014; Madin & Macreadie, 2015), and tea production

(Vermeulen, & Dengerink, 2016). This thesis will add to academic literature by providing a proposal for a CS certification scheme specific to the craft brewing industry in Ontario. Concepts established within literature review and content analyses will be synthesized with information obtained through informational interviews. Emerging data will consider industry-specific aspects for the craft brewing industry in Ontario to support elements within the proposed certification and proposed preliminary optional indicators.

The objectives of this thesis will be to:

- 1) Compile and synthesize relevant information regarding self-regulation, and the craft brewing industry.
- 2) Identify relevant emerging information from literature review, content analysis, and interviews that may be used to determine viable content, composition, and structure for a sustainability certification scheme proposal for Ontario-based craft brewers.
- 3) Develop a proposal for an industry-specific sustainability certification scheme for Ontario craft breweries that includes guidelines, and a preliminary list of sustainability indicators.

Literature review will provide insight into the craft-brewing industry regarding sustainability management, and relevant topics related to self-regulation. Content analyses will consider the relevance of existing certification schemes, and the best practices, and projects reported by sustainability leaders in the craft brewing industry. Interviews will offer information related to current management practices, and stakeholder interests

regarding sustainability and certification in the craft brewing industry in Ontario. The study will present sustainability certification as an opportunity to improve sustainability management practice, and sustainability performance within the craft brewing industry in Ontario.

6.3 Research Approach

Research is defined by Gliner et al. (2017, p. 3) as, “A systematic method of gaining new information.” Gliner et al. (2017) require research to be systematic, and to follow defined guidelines. The systematic method, and defined guidelines used by the researcher must be replicable, and if tested by a different researcher, the research methods would garner the same findings (Gliner et al., 2017). The research methods, and approach within this thesis will be disclosed within this chapter.

The research within this thesis follows a mixed methods approach. Research is mainly qualitative and inductive, and is exploratory in nature. There is both primary, and secondary research. Semi-structured interviews are one of the data collection methods employed within this research. The semi-structured interviews are qualitative and inductive. Methods also include two content analyses. One content analysis follows a qualitative and inductive approach, and the other has a quantitative approach. Secondary research is offered through a literature review. Research is mainly qualitative, and exploratory in nature because the topic of self-regulation within the craft brewing industry in Ontario is not adequately addressed within existing literature to support alternative methods.

6.3.1 Qualitative, Quantitative, and Mixed Method Research

The term “qualitative research” was originally used to describe research that was not quantitative (Flick, 2007). Several aspects have since been identified that help offer a more specific definition. Qualitative research communicates via written text, and is concerned with understanding perspectives of the participants involved (Flick, 2007). The methods employed through qualitative research should be appropriate to build understanding around a process, or connection concerning the research topic (Flick, 2007). A qualitative approach to research allows the researcher to pursue new ideas throughout the research process (Eriksson & Kovalainen, 2008). Compared to strict quantitative research, qualitative research allows the researcher more flexibility to pursue new tangents that arise during the research process (Eriksson & Kovalainen, 2008). Qualitative research offers beneficial data collection, analysis, and interpretation methods that are not available with quantitative research (Gliner et al., 2017). Qualitative data is mainly subjective, and deals with personal perceptions, or attitudes (Gliner et al., 2017). Denzin and Lincoln (2005) offer the following definition for qualitative research that will be accepted for this thesis:

“Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study

things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them" (p. 3).

Quantitative research is the most popular research approach within social science disciplines (Gliner et al., 2017). Quantitative research relies on measurement (Watson, 2015). Quantitative research is concerned with systematically investigating a topic using numerically measurable data (Watson, 2015). One major benefit of quantitative research is that the results from multiple quantitative studies may be synthesized to answer a research question that would be outside of the scope of a single research study (Gliner et al., 2017). Quantitative data is objective, and may be classified easily (Gliner et al., 2017).

Mixed method research is defined by Johnson et al. (2007) as follows:

"Mixed methods research is an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results" (p. 129).

A mixed method research approach is more beneficial to inform policy, and is better to address practical research questions compared to qualitative or quantitative research alone (Brannen, 2005). A Mixed method research approach can be used in multiple different ways (Denscombe, 2008). By combining multiple types of data, mixed methods

research is argued to offer more well-rounded results compared to qualitative, or quantitative research alone (Denscombe, 2008). Mixed methods may also result in more accurate data (Denscombe, 2008). Finally, mixed method research may be better suited to remove bias (Denscombe, 2008). Mixed method research was the most applicable approach to retrieve information to answer the research question in this study.

6.3.2 Semi-Structured Interviews

Semi-structured interviews used within this thesis are a qualitative data collection method. Wengraf (2001) accurately identifies that semi-structured interviews may be a method employed within qualitative research purposefully designed in an effort to achieve knowledge. Designing interview questions help direct the conversation. Interviews may be designed in different ways. Interview designs may be structured, semi-structured, or unstructured (Wilson, 2012). Semi-structured interviews rely on an established list of questions, but unlike structured interviews, they are more flexible resulting in semi-structured interviews being more conducive to qualitative research (Wilson, 2012). Semi-structured interviews take significant preparation to plan questions, and are higher-risk compared to structured interviews (Wengraf, 2001). Semi-structured interviews may have very rich results, or very poor results (Wengraf, 2001). There are different ways to conduct interviews, including in-person or over the phone (Wilson, 2012). Phone interviews are cost-effective and offer the participant the comfort of choosing the interview environment (Wilson, 2012).

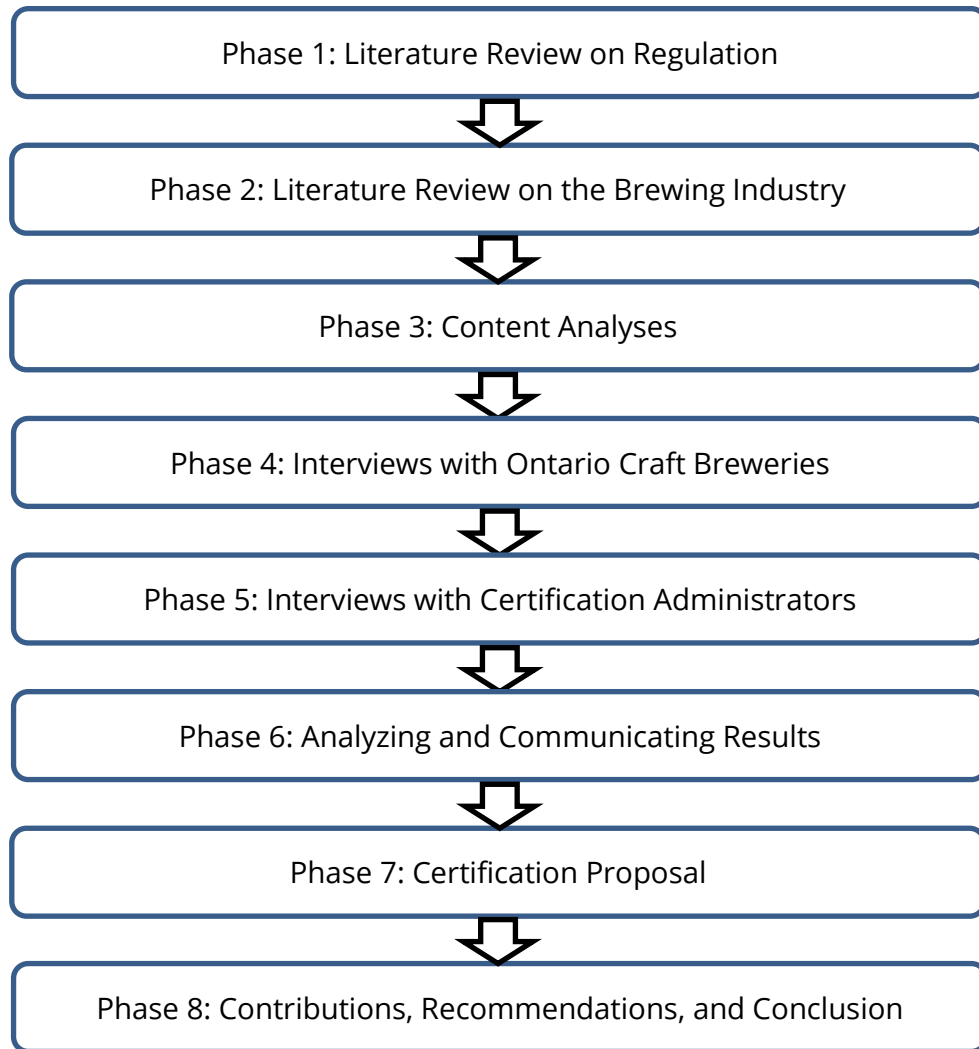
6.3.3 Content Analysis

Described by Weber (1990), “Content analysis is a research method that uses a set of procedures to make valid inferences” (p. 2). Content analysis may be qualitative, or quantitative (Wilson, 2016). Quantitative content analysis starts with predetermined categories to analyse information, and qualitative content analysis reviews information and seeks to create categories for emerging information (Wilson, 2016). Results from content analysis are used to draw conclusions, or inferences emerging from the media under research (Wilson, 2016). Content analysis is popularly used within social science research (Wilson, 2016).

6.4 Research Process

The research process within this thesis is largely inductive. Inductive data collection seeks to collect relevant data that will be used to create theory (Wengraf, 2001). Figure 1 shows each phase of research.

Figure 2: Phases of Research



6.4.1 Phase 1: Literature Review on Regulation

The literature review regarding regulation was the first phase of research. Topics covered include different types of regulations, CSR, CS, EMS, certification, reporting, and sustainability management as it relates to SMEs. A literature review was important to provide context for the proposed certification, and articulate relevant theory that will be used to substantiate elements within the proposed certification.

6.4.2 Phase 2: Literature Review on the Brewing Industry

The second phase was a literature review concerning the craft brewing industry. This phase focused on the historical emergence of the craft brewing industry in North America, the current state of the brewing industry in Ontario, operational components involved with the craft brewing industry, and leading management practices regarding sustainability within the craft brewing industry. This literature review was important to properly position the craft brewing industry in context, and to help uncover some of the important drivers, interests, and challenges to manage sustainability within craft breweries in Ontario. Literature review was mainly inductive, and exploratory.

6.4.3 Phase 3: Content Analyses

There were two content analyses included within this study. The first was quantitative, and considered existing standards and certification schemes that may be relevant to craft breweries in Ontario. Refer to Appendix 3 to review the data collected. A global directory of standards, certification schemes, codes, and ecolabels has been compiled by Big Room (2017a). The directory contains 465 unique schemes (Big Room, 2017a). The directory created by Big Room was chosen because of Big Room's previous work to categorize ecolabels (Big Room & World Resources Institute, 2010), the breadth of standards included within the directory, and the quality of the structured display of data. Other compilations of ecolabels do exist, such as the list created by the United Nations Environment Programme (2009), and the directory created by the Global Ecolabelling

Network (2017). The quality of the structure within the directory presented by Big Room enables easy access to information that has improved the research process.

The research question directing content analysis is as follows: are there any certification schemes relevant to Ontario craft breweries that consider sustainability performance for the entire enterprise? Categories were made to analyse the 465 unique schemes. Categories were made to consider potential relevance. The first category filtered the 465 schemes with the following required criteria: schemes must be available in English, in Ontario and potentially relevant to the craft brewing industry. All schemes that are not adoptable in Ontario, are not offered in English, and are specific to other industries were removed. The remaining 64 schemes were analysed quantitatively by considering the following categories:

- 1) Total number of performance-related schemes.
- 2) Total number of performance related schemes for a single aspect.
- 3) Total number of product related schemes that are not performance-based.
- 5) Total number of schemes that consider enterprise sustainability relevant to the Ontario craft brewing industry.
- 6) Total number of schemes that do not fit any other category.

A qualitative content analysis was also performed to consider two sustainability leaders within the craft brewing industry. Two industry leaders were chosen, and public

reports from each firm were considered within the content analysis. Content analysis was inductive, and sought to determine emerging concepts, categorize the concepts, and communicate the findings. Selection criteria to determine industry leaders were as follows:

- 1) The brewery must be defined as a craft brewery and must publically present a report through the company website that includes sustainability-related information;
- 2) The brewery must be acknowledge as a sustainability leader by receiving an award from a third-party endorsing the brewery's sustainability management efforts.

First, breweries in Ontario were considered for inclusion within the content analysis. There were no breweries within Ontario meeting the selection criteria for this content analysis. Two breweries were identified in the United States. The definition of “craft brewery” created by the national industry association in the United States identified earlier in this thesis was followed because both breweries are located in the United States. The report required within the selection criteria is distinct from other types of online communication. The report must have a defined start-date and end-date, and must not be presented in an updateable format. In contrast, information communicated by breweries through social media platforms, blogs, or updatable web pages did not meet the selection criteria. The report was the only type of communication considered within this content analysis to provide a reproducible process for content analysis.

The second selection criteria require breweries to receive an award endorsing sustainability-related efforts from a third party. The type of award, date the award was received, and criteria required by the award committee are not declared. Simply requiring

a third-party to acknowledge sustainability management efforts provides additional assurance that the brewery is a sustainability leader beyond a self-declaration from the brewery. Only craft breweries with awards received between 2014 and 2016 were included.

The selection criteria within this content analysis are different from the selection criteria for interviews with Ontario craft breweries identified in Phase 4. Selection criteria in Phase 4 require participating breweries to have less than 250 employees. Within this content analysis, the selection criteria do not set a limit for the number of employees, but simply require the breweries to be defined as a craft brewery.

Two firms were identified, their public reports were analysed, emerging concepts were identified and categorized, and the results were comparatively discussed. Although there may be more breweries that fit the selection criteria, the number of firms to include within the analysis was chosen to be two similar to research by Haddara and Lingard (2016), and Poon and Rowley (2007). Both Haddara and Lingard (2016), and Poon and Rowley (2007) perform comparative content analysis from two separate origins within their respective research studies. One of the two breweries included within the content analysis has been identified to have more than 250 employees. Although the selection criteria for interviews explained in Phase 4 requires participants to have less than 250 employees, and although all craft breweries in Ontario may have less than 250 employees, the information obtained within content analysis is still relevant, and applicable. The craft brewer within content analysis with more than 250 employees faces similar challenges regarding sustainability management, and deals with similar sustainability issues. Ontario craft

brewers may also grow to have more than 250 employees. Future research recommendations communicated later in this thesis address the need to identify and quantify the extent to which brewery size impacts sustainability performance.

6.4.4 Phase 4: Interviews with Ontario Craft Breweries

There were two semi-structured interviews created for two separate groups. The first group was comprised of four different craft breweries and is the fourth phase of research. It was required that each participant must meet the following selection criteria:

- 1) The firm must be located in Ontario.
- 2) The firm must have less than 250 employees.
- 3) The firm must publicly communicate information relating to sustainability management.

To account for industry needs, there was no requirement set for which representative to contact within the firm. Simply, the most appropriate decision maker within each firm would be interviewed. Job titles from participants include the following: President and Owner, Vice President & General Manager, Compliance and Sustainability Officer, and Quality Assurance and Compliance.

The first selection criterion requires participants to be located in Ontario. Setting a geographic boundary was also done in similar studies (Andersson, 2016; Delzeit & Holm-Muller, 2009). The regulatory environment in Canada is organized with the responsibility of

most environmental matters, workers' rights and safety, and alcohol being managed provincially (Ontario, 2017b). Aligning the interests of traditional public regulators, with a self-regulatory certification supports the defined geographic boundary. There is a provincial industry association in Ontario providing leadership to Ontario-based craft breweries called the Ontario Craft Brewers (OCB) (Ontario Craft Brewers, 2017a). The OCB will later be suggested to administer the certification.

The second selection criterion requires participants to have less than 250 employees. SMEs have been defined by having less than 250 employees (Mesu et al., 2015; Organization for Economic Co-operation and Development, 2004). It is important to include this criteria for knowledge gained through literature review on SMEs to be directly relevant to the participants.

The final selection criterion requires participants to publicly communicate information relating to a commitment to sustainability management. This selection criterion was included to ensure participants have an interest in the interview topic, and because firms that publicly communicate this type of information may reasonably be expected to have higher quality input than firms that do not. A list of 283 Ontario-based small breweries was compiled, and the website of each brewery was searched for the terms "sustainability," and "environment." The search function in Google Chrome was used to perform the website search. Please refer to Appendix 3 for the list of breweries. In order to meet this criteria, a commitment to sustainability, or environmental management must clearly be identified.

The selection criteria suggest that the sampling method was purposive. Specifically requiring participants to publicly communicate information related to sustainability management dramatically reduces the potential sample size, and directs the selection of participants based on the rich information they are expected to hold related to the research topic. Purposive sample selection is more often used with qualitative interviews, and is not concerned with statistical relevance (Suen, Huang, & Lee, 2014). The sample size within purposive sampling is often determined by the quality of data received (Suen, Huang, & Lee, 2014). Rather than a complete randomized sampling, the third selection criterion creates a purposive sample. Purposive sampling is ideal within this study to extract the sought after information.

All firms meeting the above research criteria were contacted via email. The email addresses used to contact each firm were found publicly through the internet. The same email was sent to all firms meeting the above criteria. The email may be found in Appendix 4.

After emailing all potential participants meeting the selection criteria, there were four willing respondents that phone interviews were scheduled with. Each interview consisted of the same 20 questions. In a relevant study by Fritzenschaft (2014) that examined the success factors associated with change management in SMEs, interviews were held with participants that also included 20 questions. The interviews lasted approximately 20-30 minutes. Designing the interview with 20 questions follows the same

approach taken by Fritzenschaft (2014), and respects the interests and time-constraints of the participants.

The interviews were held over the phone, and participants' responses were transcribed as they were given. All participants confirmed the accuracy of their transcribed responses. Participants were also asked to choose the time of the interview. Allowing participants to choose the time of interview, and holding interviews over the phone rather than in-person allows participants to choose a comfortable time, and physical environment (Wilson 2012). Phone interviews are also more efficient by taking less time to schedule, and reduce potential financial costs associated with in-person interviews (Wilson, 2012). Phone interviews were held for these reasons.

Semi-structured interviews were used with the interest of receiving very rich data from voluntary respondents. Semi-structured interviews were the ideal method to collect data during this research phase. Compared to questionnaires, surveys, or structured interviews, semi-structured qualitative interviews may result with higher quality data from thoughtful responses (Rosaline, 2008). Open-ended and closed-ended questions were used. There were very few closed ended questions. The majority of questions were open ended with the interest of influencing the depth of response from participants. Considering the limited number of potential participants meeting the research criteria, the interview was not piloted. Within semi-structured interviews, piloting does not always account for changes being made within the survey content or the order the questions are asked

(Rosaline, 2008). Interview questions were pretested with the intent to identify potential problems with the research questions.

Interview questions and answers are found in Appendix 6. There are four different categories of questions strategically made within the interview question template. The categories of questions are as follows:

- 1) Size of firm (questions 1 and 2).
- 2) Existing sustainability management practice (questions 3-9).
- 3) Perceptions of sustainability certification (questions 10-15).
- 4) Content of potential sustainability certification (questions 16-20).

The first category collects information regarding the size of the firm. This is important to identify at the beginning because different sized firms will have different resources. This factor may influence answers throughout the remainder of the interview. The second category collects information regarding existing sustainability management practice within each firm. This is important knowledge to have as a very rough preliminary benchmark regarding existing sustainability management practice within industry leaders in the craft brewing industry. This knowledge will help shape proposed indicators and requirements within the proposed certification presented later in the thesis. The third category of questions is concerned with the participants' perceptions of sustainability certification. This is important knowledge because it establishes if firms already hold certifications, and whether they would be interested in being certified to a sustainability standard. The fourth category of questions asks probing questions concerning participants'

opinions on the content, and composition of a sustainability certification scheme. This knowledge will influence the content, composition, and requirements within the proposed sustainability certification presented later in this thesis.

In an effort to improve the ethical nature of the interviews, the identity of all participants is not revealed. Transcribed responses were coded with a code name for each participant. Transcribed responses were held within a locked electronic device by the principle researcher solely. All transcribed interview responses will be discarded within one year after the beginning of research to improve the ethical nature of the interview process. The anonymity of participants in qualitative research interviews is important to maintain to protect the participant (DiCicco-Bloom & Crabtree, 2006). The participants were informed before the interviews that all information they provide would be voluntary, and that answers were not required if they did not wish to answer one or any questions. Guaranteeing anonymity within qualitative interviews is difficult, and not always completely successful (Saunders, Kitzinger, & Kitzinger, 2015), however, making every effort to balance data quality and anonymity is important (Saunders, Kitzinger, & Kitzinger, 2015).

6.4.5 Phase 5: Interviews with Certification Administrators

In the fifth phase of research, interviews were held with existing certification administrators. The selection criteria require administrators to 1) be located in North America, and to 2) offer an industry-specific sustainability certification scheme. Potential participants were found through the internet. Organizations that met the selection criteria were contacted through emailing a publicly available email address. The email sent to each

potential participant is found within Appendix 5. Eight organizations were contacted, and four organizations were interviewed. Having a small group of key informants is similar to Andersson's (2016) study that considers sustainability certification in the event tourism industry. Having a small number of participants is common within a purposive sample. Research does not require quantitative statistical analysis to analyse results, and does not require a large sample size.

Four interviews were held with four different certification administrators. Certification administrators are considered key informants within this study. Similarly to the interviews with craft brewers, interviews with administrators consisted of 20 questions and were held over the phone. The participant was also allowed to choose the time of the interview. Phone interviews allow added comfort for the participant because he or she may choose the physical space they are in during the interview, and are financially responsible (Wilson, 2012). Having 20 questions mirrors interviews performed by Fritzenschaft (2014), and respects the time constraints of participants. Answers were transcribed as they were given. All responses were confirmed for accuracy by the participants. Interviews were semi-structured to encourage the participant to elaborate on significant topics in order to retrieve rich data. Rosaline (2008) suggests semi-structured interviews allow the researcher to focus on topics, and concepts that are important to the participant, and may result in more robust data in comparison to structured interviews, or questionnaires. Interviews were not piloted because piloting does not always account for changes being made within the survey content (Rosaline, 2008). Semi-structured interviews were the best suited

method to collect data within this research phase. Job titles of interviewees include the following: Director of Programs, Program Director, Certification Manager, and Program Director.

Interview questions and answers are found in Appendix 7 and there are three different categories of questions. The categories are as follows:

- 1) The interviewee and organization (questions 1, 2, 7, 9, 14, and 15).
- 2) Composition of certification (questions 3, 4, 5, 6, 8, 10, 11, 12, and 13).
- 3) Influences, perceptions, and advice (questions 16, 17, 18, 19, 20).

The first category of questions gave knowledge regarding the organization itself, and the experience of the interviewee. This helped to give context to the interview, and understanding relating to the administration body. The second category of questions concerning the composition of the individual certification schemes was important to provide knowledge on the elements included within the composition of other industry-specific sustainability certification schemes, and helped direct elements within the composition of the proposed certification presented later in this thesis. The questions within the third category were opened ended to encourage additional input that may not have been included earlier. The advice and perceptions communicated in the third category of questions also helped influence elements within the proposed certification presented later in this thesis.

Similarly to interviews held with craft breweries, the interviews with certification administrators were held with the intention of keeping each participant's identity anonymous. The names of participants were coded, and held on a locked electronic device accessed by the primary researcher alone. Participants were informed before the interviews that they were not required to answer all or any of the questions. Anonymity within qualitative interviews is an important ethical concern, and participants' identities should be kept anonymous (DiCicco-Bloom & Crabtree, 2006).

6.4.6 Phase 6: Analyzing and Communicating Results

The sixth phase of research was focused on analyzing the data and information gained through interviews and communicating the results. The transcribed interviews were compiled, and the answers from each respondent were compared for every question. Comparing all responses for each individual question was a simple method to analyze the qualitative data. This process allowed themes, and relevant perceptions to emerge. Themes and relevant responses to every question for each interview group were communicated within results in Chapter 6. Analysis was inductive and the communication of results intended to articulate the important emerging data that may be useful to answer the research question.

6.4.7 Phase 7: Certification Proposal

The seventh phase of research presents a preliminary proposal for a sustainability certification scheme. The key findings from primary and secondary research are combined

and synthesized to support elements within the proposed certification. The proposed certification content and organization is substantiated.

6.4.8 Phase 8: Contributions, Recommendations, and Conclusion

The eighth phase of research is the final research phase. Interesting observations emerging from the research process are communicated. Recommendations for future research are identified. Finally, a conclusion is offered.

6.5 Limitations

There are several limitations within the research methodology that must be acknowledged. Although the limitations presented may cause constraints, the data collected is still very helpful to answer the research question. High quality data and information were able to be obtained within this research.

There were only four craft breweries interviewed. It should not be expected that four firms will accurately represent all the interests of all firms within the craft brewing industry in Ontario. The selection criteria for breweries require that firms publicly communicate CS efforts. This selection criterion creates a purposive sample. The few breweries that do communicate CS efforts may reasonably be expected to have unique, and substantial information on the topics of sustainability performance, and certification. However, there may be other breweries in Ontario with an interest in the topics of sustainability performance and certification that were not included within this research.

There were only four certification scheme administrators interviewed. These four organizations are not expected to account for all the possible variances regarding the composition, and content of CS certification schemes. The selection criteria required each certification administrator to offer industry-specific certification, however, some industries relate more closely than others to the craft brewing industry. An effort was made to include certification administrators operating in the manufacturing sector, but this was not a selection criteria. Having interviewees not necessarily operating in the manufacturing sector may reasonably be expected to lead to a broader range of responses, and may also lead to more general answers not necessarily directly relatable to the craft brewing industry. Only interviewing four certification administrators is not expected to account for all the interests and perspectives of certification administrators.

Interviews for both breweries, and certification administrators were held to 20 questions. Limiting interviews to 20 questions reduces the information received from interviews. Having 20 questions does accommodate the interests of participants by limiting the time needed for an interview. In this context, time was a limiting factor. Specifically, interviews were not able to consider a sustainability index. Future recommendations offered in Chapter 6 further discuss suggestions for further research for the composition of a sustainability index.

It may reasonably be expected that the interests of all stakeholder groups were not included within the primary research within this thesis. Interviews were only held with breweries, and certification administrators. The interests of government bodies, local

communities, and other civil actors were not included within the primary research of this thesis. This thesis is made with the goal of producing merely an initial proposal for a sustainability certification scheme for the craft brewing industry in Ontario. Before addressing the interests of all stakeholders, it is necessary to determine the relevancy, and potential composition of a certification scheme. This topic is further addressed in the recommendations for future research in Chapter 6 that suggest additional research for the composition of the proposed certification scheme.

Semi-structured interviews were used as a primary data collection method of this thesis. One limitation of an interview is that they are influenced by the knowledge held by the participants that they are in a study (Gliner et al., 2017). A participant knowing that he or she is a part of a study may cause the participant to offer answers that are expected to please the interviewer, or to hide certain pieces of information inevitably resulting in interview bias (Gliner et al., 2017). This type of participant bias may be reduced by the interviewer building rapport with the interview (Gliner et al., 2017), but is not expected to be completely eliminated within the semi-structured interviews within this thesis.

Qualitative content analysis only considered public communications from two breweries. Although content analysis did uncover rich data, it cannot be expected to comprehensively identify all the best practices, and relevant sustainability indicators publicly reported by craft breweries.

Quantitative content analysis only considered codes and standards within the global index created by Big Room (2017). There may be additional certification schemes, codes, or

standards in existence other than those within the index compiled by Big Room (2017) that were not identified.

Comprehensiveness of data obtained through a literature review may be a limitation (Graci, 2008). Although data regarding the sustainability impacts, and best management practices of craft breweries is not extensive, and readily available within academic literature, that does not mean that information on these topics does not exist. It is possible that information on these topics has been overlooked within the literature review.

6.6 Conclusion

Within this chapter the purpose and objectives of the research were described. Research methods were identified. The approach to research was described. The process for all phases of research was described. Limitations were acknowledged and identified. The research methods and approach taken within this thesis were substantiated within this chapter.

7.0 Interview Results

Within this chapter, the results from two informational interviews will be disclosed. First, interviews with craft breweries will be considered. Second, interviews with key informants from organizations offering sustainability certifications will be considered. The knowledge, and perceptions held by participants will be analysed for the potential relevance to influence the design of the proposal for certification presented later in this thesis. Analysis will focus on identifying emerging themes, and key elements communicated through interviews.

7.1 Interviews with Ontario Craft Breweries

Four interviews were held with Ontario craft breweries. Aligned with the participant selection criteria outlined within the methodology, all participants have less than 250 employees, are located within Ontario, and publicly communicate information regarding sustainability management. 20 questions were asked of each of the four breweries. The 20 questions have four distinct categories that consider different topics. The categories are 1) the size of the firm, 2) existing sustainability management practice, 3) perceptions of sustainability certification, and 4) content of potential sustainability certification. The perceptions, and knowledge shared by participants brought considerable insight into the interests of craft breweries regarding sustainability certification. The results from each category of questions will be considered together to communicate and analyse the rich data collected through the four interviews. All interview questions and answers may be found in Appendix 6.

7.1.1 Size of the Firm

Questions 1 and 2 within the four interviews with craft breweries dealt with establishing the size of the brewery represented by each participant. First question presents three potential categories regarding the number of employees held by each brewery. The three categories are 1-50 employees, between 50 and 100 employees, and over 100 employees. Two respondents declared they have over 100 employees, and two respondents declared they have less than 50 employees. The second question considers the annual volume of beer production for each participant. Three categories are offered. The first category is 1-30,000 HL, the second category is 30,000-100,000 HL, and the final category is over 100,000 HL. Two participants declared their annual production to be between 30,000 HL and 100,000 HL, and two participants declared their annual production to be between 1 HL and 30,000 HL.

In an effort to add context to the size identified by each participant, a publication by the Ontario Craft Brewers Association in 2006 identified 29 member breweries employing 453 workers (Ontario Craft Brewers, 2006a). The mean employment within the OCB member breweries in 2005 is 15.6 (Ontario Craft Brewers 2006a). The mean employment rate for Ontario craft breweries in 2015 identified through data presented by the Ontario Craft Brewers (2017c) was 7.1 employees per brewery. This data suggests that two participants interviewed are large sized craft breweries holding over 100 employees, and two participants interviewed are average sized breweries holding between 1 and 50 employees. The majority of craft brewers in Canada were identified by the Ontario Craft

Brewers (2006b) as producing less than 15,000 HL of beer annually. The findings within question 2 correspond with the findings within question 1 that suggest two of the participants are large sized craft brewers, and two of the participants are average sized craft brewers.

7.1.2 Existing Sustainability Management Practice

Questions 1-9 within the interviews with craft breweries consider existing sustainability management practice. This category of questions provides knowledge and context regarding the existing sustainability management practice within leading Ontario craft breweries. This knowledge is important to understand what is currently being done to manage sustainability, or improve sustainability performance. Understanding the current state of sustainability management provides relevant information to make decisions regarding how to improve sustainability management, and sustainability performance. Relevant data, and knowledge gained from each question will be disclosed.

Question 3 asks the length of time the firm has had a commitment to manage sustainability. Three respondents identified that the commitment had been in place since the start of the brewery, and the last respondent identified that the commitment had been in place for more than 10 years. Interviewee 3 (2017) declares the commitment to sustainability management had been established “from the beginning; it’s a primary cornerstone.”

Question 4 asks if the firms have a commitment to sustainability management from the top-level decision maker, and if they have a designated position to manage sustainability. All participants identified that they have both a commitment from the top-level decision maker and a designated position to manage sustainability.

Question 5 asks if the firm has a formal EMS, and if they do not, then whether or not they have defined materiality and set goals and targets for improvement. None of the firms have established a formal EMS. Interviewee 2 (2017) says, “[We have] no certification, ISO is too expensive and doesn’t fit.” All responses from participants regarding whether they have defined materiality and set goals and targets for improvement were vague. Interviewee 1 (2017) says “[we] track some metrics through quality management.” Interviewee 4 (2017) says “[we are] working with a third party engineering firm to quantify emissions, and sequester carbon on-site.” The response by interviewee 4 was the most insightful response. Interviewee 4 was also the only participant to identify carbon, or climate within the interviews.

Question 6 asks the participants to describe the decision making tools they use to support sustainability management. The answers given within this question by participants were very vague and did not directly answer the question. Interviewee 2 (2017) says, “Everyone in the company know[s] about our initiatives, it’s included in training.” Interviewee 3 (2017) says, “Wastewater was made a priority, energy is a secondary focus.” Although these responses do not answer the specific question asked, they do provide excellent knowledge trying to be obtained by the second category of questioning. Both of

these responses provide insight on the current sustainability management practices by identifying that training to all employees includes sustainability topics, and that wastewater and energy are important aspects.

Question 7 asks participants to describe their data collection methods. All participants identified utility bills as a source of data collection. Two participants identified in-house flowmeters to track wastewater volume. One participant identified in-house pH monitoring. One participant identified that their enterprise resources planning software helps provide data. Included within one of the responses was an insightful statement that did not directly answer the question. Interviewee 2 (2017) says, "It's more impactful to look upstream. Legislation doesn't make sense regarding water consumption and wastewater." Interviewee 2 identifies an interest to consider impacts occurring outside the focal firm, and identifies the inadequacy regarding public regulation to address water and wastewater impacts.

Question 8 asks each participant if they have established a budget for sustainability management. All respondents identified that they have not established a budget for sustainability management. Two respondents identified that projects are considered as they arise. It is worth noting that in question 4 all respondents identified that they have a designated position within their respective firms to manage sustainability. If the managers responsible for sustainability do not have a formally established budget, and each project must be considered as they arise, then this would seem to be a significant barrier.

Question 9 asks about the communications of the firms regarding sustainability management. All firms do communicate information through their respective websites. Interviewee 3 (2017) identifies that “we will also have a digital platform at the brewery that customers can view water, energy, and carbon use.” This statement identifies water, energy and carbon as significant aspects.

The data collected within this category of questioning provides rich insight into the existing sustainability management practice within firms. Information and perceptions obtained within this category of questions identify the following: no brewery has established an EMS; ISO standards are not relevant to craft brewers in Ontario; brewers have not established budgets to manage sustainability; defining materiality could be improved; data collection could be improved; and excellent wastewater management could be a potential RBV resource attribute; consideration of upstream impacts would garner benefits.

7.1.3 Perceptions of Sustainability Certification

The third category of questioning within questions 10-15 considers participant perceptions of sustainability certification. Participant answers will be reviewed and analysed.

Question 10 asks participants if they expect a financial return from their communication efforts regarding sustainability. Interviewee 1(2017) says that “consumer loyalty helps.” Interviewee 3 (2017) says, “It’s important to customers. It’s an important

differentiator.” Interviewee 4 (2017) says, “We believe society in general is moving this direction. Our interest is also a moral obligation.” Within the responses to this question participants identified influences of adopting sustainability management to include market differentiation, customer loyalty, and moral obligations. These responses identify the perception that communicating sustainability-related information publically could be a strategic RBV resource attribute.

Question 11 asks participants to explain the business case for adopting sustainability management. Responses offered similar findings to question 10. Interviewee 1 (2017) declares, “Consumer loyalty, [and] efficient operations” support a business case. Interviewee 3 (2017) says “it’s a differentiator.” Responses to question 11 further indicate that the participants perceive sustainability management as a RBV resource that act as a market differentiator.

Question 12 asks participants if they currently hold existing sustainability-related certifications. One respondent reference an organic certification, the remaining three participants communicated that they did not hold a certification. Interviewee 2 (2017) says, “It doesn’t financially make sense. The cost could go towards more beneficial projects.” Interviewee 2 identifies a lack a financial resources available for certification. Interviewee 2 is also one of the larger craft breweries interviewed, and may seemingly be better positioned to gain access to financial resources for certification. The lack of financial resources mirrors data emerging from literature review (Komives & Jackson, 2014; Waide & Bernasconi-Osterwalder, 2008).

Question 13 asks participants if they have external assurance of any kind for sustainability management efforts. Similarly to question 12, one respondent identifies that organic certification requires external assurance, and three respondents declare that they do not have any external assurance.

Question 14 asks participants if they think there would be a consumer willingness to pay for craft beer with a sustainability certification. Three respondents suggested that certification would result in willingness from consumers to pay more for the product. Interviewee 4 (2017) suggests that certification might result in a willingness to pay, but “it would depend on what the commitment is.” This question indirectly identifies the participants’ perception of certification. All participants view certification as a factor influencing consumer willingness to pay.

Question 15 asks participants if they would consider adopting an enterprise-level sustainability certification. All participants communicated that they would be interested. Interviewee 2 (2017) offers the caveat that it would “need to make sense.” Interviewee 1 (2017) offers additional insight by saying, “It wouldn’t make sense to certify just one product.”

Questions 10-15 consider the perceptions of participants towards adopting sustainability-related certification. Participants identify the following: there is an interest in adopting a certification; certification would need to have substance; existing certifications do not fit with the interests of craft brewers; market differentiation has emerged as an important motivator to adopt sustainability management practices and supports resource

based theory; and market differentiation, improved efficiency, moral obligation, and consumer loyalty are all influences for craft brewers to manage sustainability.

7.1.4 Content of Potential Sustainability Certification

The fourth, and final, category of questions posed to participants representing craft breweries considers the content of a potential sustainability certification. The perceptions, and interests of craft breweries within this category directly influence the content and composition of proposed certification guidelines and sustainability indicators presented later in this thesis. Questions 16-20 and responses will be considered.

Question 16 asks participants if they think craft brewers would be able to publish an annual sustainability report. The data quality within this question was excellent. Interviewee 1 (2017) responds “yes, a report might hold more weight than an audit.” Interviewee 1 is the only participant with a certification and the only participant that undergoes third party assurance. With this unique perspective, interviewee 1 suggests that reporting would be more stringent than a third party audit. Interviewee 2 offers a very insightful comment. Interviewee 2 (2017) suggests that “[requiring an annual report with no audit] may not be as stringent as other schemes out there. It would have to be accessible for brewers though. If it achieved buy-in, it would have to include a mechanism for performance evaluation and comparison. It would be good to have separate groups based on production volume.” These responses went well beyond answering the question asked, and gave significant insight regarding the interests of craft brewers towards the composition of a sustainability certification, and annual report.

Question 17 directly asks participants what they think should be included within a certification scheme. Interviewee 2 (2017) says “[it should include] performance evaluation, it should be tiered and comparable.” Similarly interviewee 4 (2017) suggests that “there could be different tiers (bronze, silver, and gold). This would make it more accessible for all breweries to have a tiered approach.” Interviewee 3 (2017) says that “breweries could achieve different levels.” Responses are consistent, and suggest a tiered approach within certification to improve accessibility.

Interviewee 3 offers a significantly rich response to question 17 that should be considered further. Interview 3 (2017) responds, “Certification needs to mean something. Maybe it could have a range of categories. There could be different best practices for different sized firms. Breweries could achieve different levels. Different priorities between breweries should be addressed. Maybe there could be a scoring system. It should recognize breweries that have made a significant effort for things that are tangible. It can’t be dumbed down that it is meaningless and doesn’t meet the goal. It would have to be inclusive, but still needs to mean something, and still needs to be a differentiator.” Based on Interviewee 3’s response to category 1 questions, Interviewee 3 is an average sized craft brewery with less than 50 employees, and less than 30,000 HL of annual production. Interviewee 3 identifies that the size of the brewery influences the best practices that should be implemented, and that sustainability performance would not be the same for different sized breweries. The balance between stringency, and accessibility is also addressed within this response.

Question 18 asks participants what funding sources should support a sustainability certification. All four interviewers reference the inclusion of the OCB. Three of four respondents suggest pursuing government support for the project. Interviewee 3 (2017) says “charging industry may be a double edged sword, depending on the demands to control the process.” This response is significant because interviewee 3 has a related response within question 19 that will be considered.

Question 19 asks participants what they think would be fair to charge firms to apply for certification. Two responders did not think that brewers should be charged. One responder said it would need to be balanced with the work that was done by the party offering certification. Interviewee 3 (2017) says, “It would be difficult to charge for this. Having breweries pay would influence results. It would cater to large brewers with the ability to pay, and it would not cater to the majority [of breweries]. Having external assurance through annual reporting is a good work-around, and would cost very little to start up.” Responses largely declare that breweries should not pay for a certification. Interviewee 3’s responses to question 18, and 19 point out that requiring breweries to pay for certification may cause unintended negative effects such as the exclusion of small brewers unable to afford the cost, and the influences of industry to control the certification process. Interviewee 3 appropriately identifies that it would not be in the interest of the majority of craft breweries in Ontario to charge industry for certification, because the majority of breweries would not be able to afford the cost, only large craft breweries would be able to afford the cost. Finally, Interviewee 3 suggests that an annual report would

eliminate audit cost, provide a certain level of external assurance, and have very low costs to implement.

The final question, posed to craft brewers within this interview asks for additional recommendations, advice, or comments. One participant did not respond, however, the remaining three offered insightful comments. Interviewee 1 gave additional suggestions for the composition of a sustainability certification. Interviewee 1 (2017) says, “[Certification] may include an information aggregate on best practices. May also include a list of preferred suppliers. Need to show breweries where to go and how to get there. Connect with other environmental service companies.” Interviewee 2 (2017) says, “[We] looked at other certifications, they weren’t useful. Certification would need to mean something if certified. Cost is a major barrier.” Interviewee 4 (2017) says, “Getting the OCB involved would be important. OCB collaboration with provincial government may help with grants.” Interviewee 1 offers suggestions for additional elements that may help breweries improve sustainability management practice. Interviewees 2 and 4 reinforce previous insights addressed in previous questions. Other certifications are not perceived as useful. Cost is again identified as a limiting factor for adoption. The inclusion of the OCB is again suggested.

7.1.5 Emerging Knowledge from Breweries

Excellent quality data was collected through interviews with four craft breweries. The perceptions, and information of participants will be used to influence the composition

of the proposed sustainability certification guideline and indicators found later within this thesis. The following important concepts, and perceptions have emerged:

- Existing standards and codes are insufficient, irrelevant, or too expensive.
- Water, wastewater, energy, and air emissions are important indicators.
- There is significant room to improve sustainability management practice.
- Influences to manage sustainability include consumer loyalty, efficiency, market differentiation, and moral obligation.
- Communicating sustainability management practices could prove to be a RBV resource.
- There is interest from participants to consider adopting sustainability certification.
- Grounding a certification in an annual report would improve accessibility, reduce cost, and still provide a certain level of assurance.
- Certification should have different tiers available to achieve.
- Certification needs to consider performance and needs to be comparable.
- Certification needs flexible requirements to accommodate different sized breweries.
- The OCB should be involved.
- Most breweries could not afford the cost of certification.
- Accessibility should be balanced with substance.

7.2 Interviews with Certification Administrators

Four key informant interviews were held with certification administrators. Aligned with the participant selection criteria outlined within the methodology, all participants offer

an industry-specific sustainability certification scheme, and are located in North America. 20 questions were asked of each of the four participants. The 20 questions have three distinct categories that consider different topics. The categories are 1) the interviewer and the organization, 2) composition of certification, and 3) influences, perceptions, and advice. Rich data was collected through key informant interviews. The perceptions and knowledge shared through interviews will help to shape the proposal for certification, and sustainability indicators found later in this thesis. The results from each category of questioning will be described and analysed. All interview questions and answers may be found in Appendix 3.

7.2.1 The Interviewee and the Organization

The first category of questioning within key informant interviews had the goal of bringing context and understanding to the organization offering the sustainability certification and the representative within the interview. Questions 1, 2, 7, 9, 14, and 15 are concerned with this information. These questions will be reviewed.

Question 1 asks participants if the type of organization they represent is private, public, or non-profit. All respondents indicated that their respective organizations were non-profit. Interviewee 4 identifies a relevant connection with an industry association. Interviewee 4 (2017) says, "We have a partnership with the industry association that we service [and] the board of directors is comprised solely of industry members." Having a partnership with the industry association is significant, and supports interests identified within interviews with craft breweries.

Question 2 is concerned with how long the organization has been operating. Two organizations identified that they had been operating for 20 years or longer. One organization has been operating for only three years, and one organization has been operating for seven years.

Question 7 asks the participants how the organization is funded. All respondents identified that in whole, or in part, they received funding from the industry they service. Two organization identified that they have received government grants.

Question 9 asks how prominent, or far-reaching the certification operates. Two organizations operate state-wide within the USA. One organization operates nationally. One organization operates in over 80 countries.

Question 14 asks the participants the length of time he or she has been involved with the organization represented. Two respondents have been involved for 10 years or more. Two respondents have been involved for three years.

Question 15 asks the participants if they were involved with creating the certification. All respondents were involved with creating the certification. These responses suggest that the participants are well-qualified to answer questions concerning the elements within their respective certification schemes, and the reasoning to include elements within their respective certification schemes.

The first category of questions brings knowledge forward concerning the organizations being interviewed, and the interviewees representing the organizations. The

knowledge gained throughout the first category of questions builds context for responses within the remaining two categories of questions.

7.2.2 Composition of Certification

The second category of questioning is concerned with the composition, and elements within the participants' respective certification schemes. Questions 3, 4, 5, 6, 8, 10, 11, 12, and 13 are within the second category. Each question will be reviewed and analysed to consider relevant emerging data.

Question 3 asks participants if the certification only covers a single product, or covers other aspects of the organizations it certifies. One certification scheme covers a single product. The remaining three certifications cover the entire enterprise.

Question 4 asks participants to briefly explain the elements required for certification, and if reporting is required, or if performance is considered. Each response by participants is worth reviewing. Interviewee 1 (2017) says, "There is a set of rules called standards. There are required questions that must be completed, and there are other management related questions that need to make up 50% of the points necessary. There is an annual documentation audit, and a full on-site audit every 4 years. There is only one prescriptive element involving process behaviour. Performance is considered."

Interviewee 1 declares that the certification includes a rule set, that there is one set of questions that are required to be completed, and another set of questions with flexible

requirements. These identifiable elements will be considered in the proposed certification and list of indicators in Appendices 4 and 5.

Interviewee 2 (2017) says that, “There are no prescriptive elements, other than a requirement to meet regulatory compliance. There are performance thresholds built on a tiered approach relative to the size of each firm.” Performance is considered within this certification, and the certification is built with tiers based on performance. These two elements are significant and are in-line with the interests of craft brewers that emerged through the interviews with craft breweries.

Interviewee 3 says that the entire supply chain must be certified. This participant identifies that there are 10 principles within the certification, regulatory compliance is required, and there are “regional variances” for requirements. It is important to note the consideration of “regional variances” and the importance of defining geopolitical lines to connect with self-regulatory certification schemes.

Interviewee 4 declares that there is a self-assessment requirement. Interviewee 4 (2017) says “there are 500 indicators” used within the self-assessment that firms must declare how closely they align with each. Structuring the certification in this way, interviewee 4 (2017) suggests “accounts for flexibility, and diversity in the industry.” Flexibility within requirements, and diversity of size were also important elements emerging from interviews with craft breweries.

Question 5 asks if there are measures in place that consider the effectiveness of certification. All participants responded that there are measures in place, and all respondents referenced that audits are required.

Question 6 asks participants if long-term aspects are considered. Interviewee 1 (2017) provides the insight that “we update our program rules every year, and we are peer-reviewed every five years.” Similarly, interviewee 3 (2017) declares that they have a “five year renewal, and we have a 20 year plan.”

Question 8 asks how the cost for certification is structured. All participants identified that the cost was based on, or partially based on the size of the firm being certified. Interviewees 3 and 4 communicated that firms were charged for audits. Interviewee 4 also referenced an administration fee to be part of the certification program.

Question 10 asks if certification considers the size of the firm, and if it does, how size is considered. All interviewees identified that the size of the firm is considered. Interviewee 4 (2017) says that there is “different cost structure and requirements” for different sized firms.

Question 11 asks if the participants provide their own assurance, or if a third party provides assurance. Two participants identified that they provide their own auditing service, and two participants identified that they require third-party auditors.

Question 12 asks if firms have to be recertified, and what the time-interval may be. All participants communicated that firms need to be re-certified every year.

Question 13 asks for additional noteworthy elements to the certification scheme. Interviewee 3 was the only participant to offer a decent answer. Interviewee 3 (2017) said that the certification was “very closely aligned with the United Nations Sustainable Development Goals.”

The second category of questioning posed to certification administrators considered the composition of each participant’s certification scheme. There was very rich data emerging from these questions that will influence elements within the proposed certification scheme in Appendix 5.

7.2.3 Influences, Perceptions, and Advice

The third and final category of questions asked to certification administrators within the interviews focused on influences, perceptions, and advice. Questions 16, 17, 18, 19, and 20 will be reviewed.

Question 16 is interested with why participants chose certain elements within the respective certification schemes. There were some very insightful responses. Interviewee 1 says, “We collaborated with industry and held multiple committee meetings. All rules sets have external peer review before being published. Rules sets are updated every year to stay current.” Collaboration with industry to create certification requirements has been a recurring theme, and is significant. Interviewee 2 (2017) says, “We wanted to balance the stringency of certification with its applicability to industry. We want to encourage as much

performance improvement as possible, so we tried to make it flexible to encourage adoption.” The sentiment expressed in this answer is also recurring, and is also significant.

Question 17 asks participants about the obstacles that were faced when developing the certification scheme. Interviewee 1 (2017) expressed that “it took a long time to get off the ground,” and that a pilot project would not be recommended. Interviewee 2 describes the need to balance the competing interests of different stakeholders, in reference to the interests of industry compared with the interests of vocal environmental groups.

Interviewee 3 (2017) said that it is “always a challenge with industry buy-in.” Similarly, interviewee 4 (2017) said that “industry must be involved... [and to] use industry people to build it.” The importance of engaging with industry members to help build certification has been a recurring theme emerging from interviews.

Question 18 asked participants if they could change any element of the scheme what it would be. This question was not relevant for all participants. All participants identified that they were involved with creating the scheme in question 15. Three participants identified that the scheme goes through regular revision, and that changes are regularly made. Although all participants were involved with creating the scheme, and although multiple participants identified that the schemes undergo regular revision, there was still potential to learn about personal opinions of the participants. Participants did not offer significant personal insight with responses to question 18.

Question 19 asks participants for advice for creating a certification for the brewing industry. Interviewee brought up the recurring theme that including industry is “crucial.”

Interviewee 2 (2017) commented on the recurring theme that it is necessary to “balance to interests of industry, and environmental groups.” Interviewee 3 offered insightful comments. Interviewee 3 (2017) says that “how it is created is important,” and that “the governance model is important; it can create credibility.” Interviewee 3 (2017) offered further advice saying, “How it’s branded is important. [You] need a high volume of communication for consumers to understand messaging.” Interviewee 4 also referenced the need for industry buy-in. Interviewee 4 commented on the recurring theme of providing flexibility to meet differences within the firms. Interviewee 4 (2017) also suggested, “Start with an ecolabel as a goal.” The responses to question 19 were very insightful. Many responses brought up recurring concepts, and suggestions that will be helpful to build the proposed certification guidelines found in Appendix 5.

Question 20 asks participants if they have any additional comments or advice. Two participants did not have significant responses, and two participants had very insightful responses. Interviewee 1 (2017) says, “Having a committee is great. Having people that are invested, and getting buy-in from multiple firms to make a committee is very important to get it off the ground. It has to be industry-led.” The inclusion and leadership of industry is further referenced by Interviewee 1. Interviewee 3 (2017) says, “We offer group certification for SMEs and small producers, in which four or five companies may be audited and certified at the same time. This may be relevant. It helps because the certification requirements are reduced and streamlined. The small producers would not be able to be

certified otherwise, and building small business in important.” These comments by Interviewee 3 suggest simplified certification requirements for SMEs improve accessibility.

7.2.4 Emerging Knowledge from Certification Administrators

Very rich data was obtained through interviews with key informants. Significant emerging concepts will be used to help build the proposed guidelines for certification found in Appendix 5. The following pieces of data, concepts, and perceptions have emerged:

- Certification should consider supply chain and end of life.
- Certification should not be limited to a single product.
- Industry should be included during the development of certification.
- Certification should hold a set of rules.
- Certification should be flexible. Flexibility improves accessibility.
- Having optional criteria can improve flexibility.
- Having different performance tiers can improve flexibility.
- Performance should be considered within certification.
- Certification should have a defined geographic area.
- Certification should balance stringency and accessibility.
- Certification requirements should be simplified to improve accessibility to SMEs.

8.0 Proposal for Certification and Synthesized Findings

The following chapter reviews the proposed guidelines and requirements for certification. The proposed certification is discussed in tandem with synthesized findings from primary and secondary research. The chapter is written to address specific topics within the proposed certification in the guidelines and requirements presented in Appendix 8 and the indicators in Appendix 1. The reasoning behind the decisions made regarding the composition of the guidelines and requirements will be substantiated within this chapter by aligning emerging data from primary and secondary research with specific elements on the proposed certification. The organization and format of the guidelines and requirements will be considered, and each section of the guidelines and requirements will be considered.

8.1 Strategy, Organization, and Format

The organization, and format of the certification guidelines and requirements has been strategic. Aspects concerning the organization and format of the proposed certification guidelines will be considered and substantiated through identifying motivating emerging concepts from primary and secondary research.

8.1.1 Reporting, Auditing, and Resource Barriers

Proposed certification guidelines require the brewery to produce an annual report. This requirement was done to reduce cost, improve knowledge and awareness, improve accessibility, and ultimately improve the sustainability performance of potential adopters.

Publically communicating sustainability management efforts with a public report or ecolabel may also be a strategic RBV resource attribute for the craft brewing industry (Duarte, Bressan, & Sakallarios, 2016), and may influence a sustained competitive advantage for adopting breweries.

Alternatively, substantive and prescriptive requirements may have been proposed. Substantive and prescriptive policies and requirements within certification would be difficult to apply to the craft brewing industry in Ontario. Performance benchmarking would first need to be established based on brewery size. The lack of human and financial resources within the craft brewing industry illustrates a low level of bureaucracy, and points to the need for certification requirements to be streamlined, simple, and accessible. Literature regarding sustainability management within SMEs also identifies a lack of resources (Tilley, 2000), and the less bureaucratic nature of SMEs (Fassin, 2008) to be barriers to applying certification schemes. This topic is further addressed in future research recommendations.

Auditing is a common method employed by certification administrators to ensure the participants meet the identified rules, and requirements. In the interviews held with certification administrators, Interviewee 2 (2017) identified within question 5 that, "there's an annual audit [required] by third party auditors." All certification administrators identified in question 11 that they require audits for certification. Similarly, literature identifies that EMSs often require a third-party audit (Kirkland & Dixson, 1999). In an interview with a craft brewery, Interviewee 2 in question 16 offers very valuable insight

regarding auditing, and reporting. Interviewee 2 (2017) says, “[requiring an annual report with no audit] may not be as stringent as other schemes out there. It would have to be accessible for brewers though.” Similarly, a certification administrator says, “We wanted to balance the stringency of certification with its applicability to industry” (Interviewee 2, 2017).

In an interview with a craft brewery, Interviewee 2 (2017) says, “[We] looked at other certifications, they weren’t considered useful... Cost is a major barrier.” Similarly, literature has identified resources as a significant barrier for SMEs to adopt a sustainability-related standard or code (International Trade Centre, 2010; Komives & Jackson, 2014; Waide & Bernasconi-Osterwalder, 2008). Literature has also identified financial resources as a challenge impacting a potential sustained competitive advantage within the craft brewing industry (Duarte, Bressan, & Sakallarios, 2016). In question 20 in an interviewee with a certification administrator, Interviewee 3 (2017) says, “The certification requirements are reduced and streamlined [for SMEs]. The small producers would not be able to be certified otherwise.”

In an effort to remove a cost barrier that would limit adoption, here is no audit required. In an effort to balance stringency with accessibility, certification requires breweries to produce a public report, does not require third-party auditing, and is not substantive. In an interview with a craft brewery, Interviewee 3 (2017) says in question 19, “Having breweries pay would influence results... Having external assurance through annual reporting is a good work-around, and would cost very little to start up.”

Although not requiring an audit or prescriptive requirements may reduce the stringency of certification, it is very important that certification is stringent enough to result in improved sustainability performance. In an interview with a craft brewery, in question 17 Interviewee 3 (2017) says, "[Certification] would have to be inclusive, but still needs to mean something." In the literature, the concept of information inductance is introduced by Prakash and Rappaport (1977) suggesting that simply by requiring a firm to publicly report on CS performance the firm will improve CS performance. Studies by Clarkson et al., (2008) and Ahmadi and Bouri (2017) show that by disclosing information on an environmental indicator, a firm may improve environmental performance. Requiring breweries to produce a public report eliminates a cost barrier imposed by auditing, addresses the less bureaucratic nature of breweries, and positively influences sustainability performance.

8.1.2 Leadership and Administration of Proposed Certification

The Ontario Craft Brewers Association (Ontario Craft Brewers, 2017c) is suggested to provide leadership and administrative services for the proposed certification. The Ontario Craft Brewers Association provides leadership for craft brewers in Ontario. The organization is built by industry members, and offers technical committees to support knowledge sharing between firms (Ontario Craft Brewers, 2017c). This suggestion is in-line with the role of the Brewers Association in the United States identified by Cooper (2014), and with findings identified by Johnson (2015) and Roy and Therin (2008) regarding the importance of a platform to share information.

Interviews with breweries, and certification administrators support the suggestion for the OCB to administer the proposed certification. In an interview with a certification administrator, Interviewee 4 says (2017), "Industry must be involved... [you should] use industry people to build it." In an interview with a brewery, Interview 4 (2017) in question 20 says, "Getting the OCB involved would be important." Literature review identifies that the lack of knowledge of a management tool, or standard is a significant barrier to SMEs' adoption of that tool or standard (Bradford & Fraser, 2008; Johnson, 2015). Trade organizations have been found within the literature to have a significant positive impact on addressing knowledge barriers faced by SMEs (Roy & Therin, 2008). The OCB is clearly well positioned to provide leadership, and administrative services for the proposed certification.

8.1.3 Streamlined and Simple

The certification requirements are written to be streamlined and simple to use. The resource barrier faced by SMEs has been identified within the literature (Duarte, Bressan, & Sakellarios, 2016; Komives & Jackson, 2014; Waide & Bernasconi-Osterwalder, 2008), and suggests that financial resources and human resources required for more in-depth, substantive standards and codes are less available to SMEs. In an interview with a craft brewery, Interviewee 2 in question 5 (2017) says, "[We have] no certification, ISO is too expensive and doesn't fit." Similarly, in an interview with a certification administrator, Interviewee 3 (2017) in question 20 says, "The certification requirements are reduced and streamlined [for SMEs]. The small producers would not be able to be certified otherwise." The streamlined and simple requirements for certification are grounded in producing a

public report in contrast with a substantive certification standard. Influences from interviews, and literature prompt the simple, streamlined nature of the proposed certification requirements grounded in a public report.

8.2 Content of Proposed Certification Guidelines

The content within the proposed certification guidelines found in Appendix 8 and the accompanying list of indicators in Appendix 1 will be reviewed. Elements within the guidelines will be substantiated with references from primary and secondary research.

8.2.1 Warning Concerning Misleading Information

Within the proposed certification there are two paragraphs warning breweries not to provide misleading information. Literature argues that there is a need for firms to provide accurate and precise information within public reports, and that one of the repercussions of providing misleading information is a reduction in performance improvement (Westphal & Zajac's, 1994 & 1998). Audits are not included, and the use of misleading information cannot be strictly enforced. The warning within the proposed certification guidelines is meant to address this issue, and dissuade breweries from providing misleading information.

8.2.2 Comparability

There is a paragraph within the proposed certification guideline commenting on objectivity, consistency and transparency. This paragraph identifies the need to remove bias within reporting, and the interests to have a standardized, comparable report. This

paragraph was influenced through an interview with a craft brewer. Interviewee 3 (2017) in question 17 says, "[Certification should include] performance evaluation, it should be tiered, and comparable." This statement shows an interest in the comparability of reports from the perspective of a craft brewery. This paragraph is included within the certification guidelines to account for the interests of a craft brewery.

8.2.3 Mandatory Disclosures

There are 10 mandatory aspect categories identified in the proposed certification guidelines. Aspect categories include 1) reporting period, 2) energy disclosures by source, 3) water disclosures, 4) solid waste disclosures, 5) climate disclosures, 6) wastewater disclosures, 7) materials and transportation, 8) local community disclosures, 9) employment disclosures, and 10) government disclosures. Each aspect category will be considered.

8.2.3.1 Reporting Period

The reporting period is the first disclosure required in the proposed certification guidelines. There is an interest from a craft brewery identified within interviews for reports to be comparable. Interviewee 3 (2017) in question 17 says, "[Certification should include] performance evaluation, it should be tiered, and comparable." For this reason, breweries are required to disclose the start date, and end of the reporting period. The reporting period is required to be one full calendar year. This disclosure is required following the interest from a craft brewery to have comparable reports.

8.2.3.2 Energy Disclosures by Source

The second aspect category is energy disclosures by source. There are four disclosures required within this category. Required disclosures include the disclosure of total electricity, total natural gas, total energy, and an energy intensity ratio. Total energy, and the energy intensity ratio have been identified within literature by Roca and Searcy (2012), and Tokos et al. (2012), as well as through content analysis within public communications by Sierra Nevada (2015). Total electricity was identified through literature (Olajire, 2012; Roca & Searcy, 2012; Tokos et al., 2012). Total natural gas was also identified through literature as a relevant indicator (Olajire, 2012).

8.2.3.3 Water Disclosures

Water disclosures are the third aspect category. There are two disclosures in this category. Total water, and the water intensity ratio are both required disclosures. Total volume of water consumption was identified as significant through literature, and content analysis (Olajire, 2012; Peel, 1999; Roca & Searcy, 2012; Sierra Nevada, 2015; Tokos et al., 2012). Water intensity was also identified through literature and content analysis (Roca & Searcy, 2012; Sierra Nevada, 2015).

8.2.3.4 Solid Waste Disclosures

Solid waste disclosures are the fourth aspect category. There are two disclosures required. Total volume of solid waste, and the solid waste intensity ratio are both required to be reported. Total solid waste is identified as significant within literature by Olajire

(2012) and Roca & Searcy (2012). Solid waste intensity is identified as a popular disclosure in Canada by Roca & Searcy (2012).

8.2.3.5 Climate Disclosures

Climate disclosures are the fifth aspect category. There are two climate disclosures required. Total scope I CO₂-e emissions, and Scope I CO₂-e intensity are both required to be reported. Total Scope I CO₂-e emissions have been identified within literature as being significant (Roca & Searcy, 2012; Tokos et al., 2012). Scope I CO₂-e emissions intensity was also identified within literature (Roca & Searcy, 2012).

8.2.3.6 Wastewater Disclosures

Wastewater disclosures are the sixth aspect category. There are two wastewater disclosures required. Total volume of wastewater, and the wastewater intensity are both required to be reported. Literature has identified both the total volume of wastewater (Olajire, 2012; Roca & Searcy, 2012; Tokos et al., 2012), and the wastewater intensity (Tokos et al., 2012) as being significant.

8.2.3.7 Materials and Transportation Disclosures

Materials and transportation disclosures are the seventh aspect category. There are two disclosures required within this category. The percentage of suppliers within Ontario, and the methods of transportation used for distribution are both required disclosures. Both disclosures were identified through content analysis. Deschutes Brewery (2015)

identifies the importance of local suppliers. Sierra Nevada (2015) identifies the importance of declaring transportation sources used for distribution.

8.2.3.8 Local Community Disclosures

Local community disclosures are the eighth aspect category. There is one disclosure required. Breweries are required to disclose the number of donations or sponsorships to local community groups. This disclosure has been suggested to be significant within literature (Roca & Searcy, 2012), and within content analysis (Deschutes Brewery, 2015; Sierra Nevada, 2015).

8.2.3.9 Employment Disclosures

Employment disclosures are the ninth aspect category. There are three disclosures required. The total number of employees, the total number of workplace injuries, and the total number of employee support programs are all required to be reported. The total number of employees was identified in literature by Roca & Searcy (2012) and Tokos et al. (2012). The total number of workplace injuries or health and safety incidents was identified by Roca & Searcy (2012). The total number of employment wellness programs was identified through content analysis (Sierra Nevada, 2015).

8.2.3.10 Governance Disclosures

Governance disclosures are the tenth and final aspect category for required disclosures. There is one disclosure required in this category. A statement regarding sustainability by the top-level decision maker is required to be disclosed. This required

disclosure was identified through content analysis through Deschutes Brewery (2015) and Sierra Nevada (2015).

8.2.4 Optional Indicators and Performance Assessment

The certification guidelines provide guidance on how performance is assessed, and the requirements for disclosing optional indicators. Three different performance tiers are proposed with different requirements for each tier. The tiers are labeled gold tier, silver tier, and bronze tier. The gold tier suggests that breweries should disclose 50% of the defined environmental optional indicators, and 50% of the defined social indicators. The silver tier suggests that breweries should disclose 35% of the defined environmental indicators, and 35% of the defined social indicators. The bronze tier suggests that breweries should disclose 20% of the defined environmental indicators, and 20% of the defined social indicators.

Interest to include sustainability performance within the proposed certification guidelines was communicated within interviews, and was identified through content analysis. In an interview with a craft brewery, Interviewee 3 (2017) in question 17 says, "[Certification should include] performance evaluation, it should be tiered, and comparable." Interviewee 2 communicates the interest for both performance to be evaluated, and for different performance tiers to be available. In an interview with a craft brewery in question 17, Interviewee 4 (2017) says, "There could be different tiers (bronze, silver, and gold). This would make it accessible for all breweries to have a tiered approach." The proposed certification requirements directly apply these interest from craft breweries.

In an interview with a certification administrator, Interviewee 2 (2017) in question 4 says, "There are performance thresholds built on a tiered approach..." Similarly, the proposed certification has different performance requirements aligned with different tiers. Interviewee 2 (2017), communicates similar requirements by saying, "There is a self-assessment... There are 500 indicators identified, each firm has to self-identify on a scale of 1-4 how closely they align with each indicator... This accounts for flexibility, and diversity in the industry." Similarly, the proposed certification requirements have a list of optional indicators found in Appendix 1. The proposed certification relies on self-assessment from each participating brewery. Flexibility is increased by the inclusion of optional indicators, and three separate performance tiers.

Appendix 1 outlines 70 different sustainability indicators. There are 21 total social indicators, and 49 total environmental indicators. 19 indicators are required, and 51 indicators are optional. The compilation of indicators took an inductive approach. Literary sources include Roca and Searcy (2012), Tokos et al. (2012), Olajire (2012), and Peel (1999). Data also emerged from content analysis. Sierra Nevada (2015), and Deschutes Brewery (2015) also provide sources. Indicators were compiled inductively to improve the expected relevance to the craft brewing industry in Ontario. Further research will need to address the list of indicators in Appendix 1 to consider additional stakeholder perspectives.

8.2.5 Suggested Formatting

There is a single paragraph within the proposed certification guideline offering suggestions on how to format the report. This paragraph is included following suggestions made through interviews.

In an interview with a craft brewery, Interviewee 1 (2017) in question 20 says, "...[You] need to show firms where to go and how to get there." In-line with suggestions by interviewee 1 the proposed certification guideline provides brewers with additional suggested formatting for compiling the required report.

8.2.6 Conclusion

Within this chapter the organization and content of the proposed certification guidelines has been reviewed and substantiated. The Specific requirements found within the certification guideline in Appendix 8 and accompanying Appendix 1 have been discussed and substantiated.

9.0 Conclusion

The craft brewing industry in Ontario has grown rapidly over recent years, and now holds 283 small breweries (Ontario, 2017). Multiple environmental and social impacts have been identified resulting from beer production. The major challenges faced by craft breweries have been identified that include a financial resource barrier, and knowledge barrier. The proposed sustainability certification guideline and accompanying list of indicators found in Appendices 1 and 8 is suggested to improve social and environmental outcomes, overcome major challenges, and potentially act as a RBV resource attribute for adopting breweries.

This chapter will review the research presented within this thesis, identify observations emerging from research, present the contributions made through this research, and provide recommendations for future research supporting the research and findings presented within this thesis. The chapter will finalize with concluding remarks.

9.1 Research Review

Chapter 1 offered an introduction to the research topic, and the research study. The thesis question was declared. The three research objectives were defined and described. The organization of the written thesis was described. Finally, a brief statement summarizing the motivation of the research study was offered.

The second chapter provided a detailed description of the methodology. The research question, the purpose of the research, and the three guiding objectives were

described. The research approach was reviewed. The approach included descriptions of mixed method research, semi-structured interviews, and content analysis. Two studies with similar topics, and similar research methods were referenced. The process of research was outlined including a description of the eight research phases. The limitations within this research study were described.

A literature review of self-regulation was the topic of Chapter 3. The literature review covered relevant public regulation in Ontario. Different types of regulation were identified, and a definition was offered for self-regulation. CSR and CS were described and defined. Definitions were offered for both EMSs and certification, and both concepts were described. The topics of performance and reporting were reviewed. The concept of information inductance was considered and examples were given regarding corporate communications connecting with performance. Sustainability management within SMEs were reviewed. Both challenges and opportunities were identified for self-regulatory concepts.

Chapter 4 offered a literature review on the Brewing industry. The background of the brewing industry in North America was reviewed. The state of the modern brewing industry, and the modern craft brewing industry in Ontario was reviewed. Definitions were offered for craft breweries, microbreweries, and small breweries. The operational components within craft brewing production were described. Sustainability management as it relates to craft breweries was considered. Materiality, specific projects, and best practices were reviewed.

Chapter 5 outlined two separate content analyses. The first analyses was quantitative and considered existing certification schemes as they may relate to the craft brewing industry in Ontario. The results were communicated. The second content analysis was qualitative and reviewed public reports from two sustainability leaders within the craft brewing industry. The results from the second content analyses were communicated, and discussed in relation to the organization of the reports, the indicators disclosed within the reports, and the specific improvement project identified within the reports.

Chapter 6 communicated the results from two separate groups of interviews. The first group of interviews were held with Ontario craft breweries. Important emerging concepts were identified and discussed. The second group of interviews were held with key informants within organizations that offer industry-specific sustainability certification. The important emerging concepts, and pieces of information were identified and discussed.

In Chapter 7 sustainability certification was proposed. The elements of the proposed guideline and accompanying list of indicators were discussed. The strategy, organization, and requirements for the proposed certification were reviewed and substantiated with data emerging from primary and secondary research.

9.2 Comments on Objectives

There are three specific objectives that were pursued within this research. Each objective has been achieved.

9.2.1 Objective 1

The first objective within research was to compile and synthesize relevant information regarding self-regulation, and the craft brewing industry. This objective has been achieved. Information was gained through literature review, two separate content analysis, and two separate interviews. This information was synthesized and communicated within the thesis.

9.2.2 Objective 2

The second objective within this study was to identify relevant emerging information from literature review, content analysis, and interviews that may be used to determine the appropriate content, composition, and structure for a sustainability certification scheme proposal for Ontario-based craft brewers. Emerging data that has influenced the proposed certification guidelines, and the proposed list of indicators has been identified. Chapter 6 reviews the emerging data that has influenced the content, composition, and structure of the proposed certification.

9.2.3 Objective 3

The third objective of this study was to develop a proposal for an industry-specific sustainability certification scheme for Ontario craft breweries that includes guidelines, and a preliminary list of sustainability indicators. This objective has been achieved. The proposed industry-specific certification scheme guidelines are presented in Appendix 8, and the accompanying proposed list of preliminary indicators is presented in Appendix 1.

9.3 Contributions

The research presented in this thesis has made a contribution to academic knowledge by offering a proposal for a self-regulatory certification scheme applicable to the craft brewing industry in Ontario. Academic literature regarding CSR and self-regulation has recently been identifying industry-specific application. This thesis offers an industry-specific proposal for CS certification within the craft brewing industry in Ontario effectively filling the literary gap.

The proposed certification guideline in Appendix 8, and the proposed list of indicators found in Appendix 1 are the two important pieces emerging from this study. Throughout the study there was significant information offered regarding sustainability and the management of sustainability directly relating to the craft beer industry that has been applied within the proposed certification scheme. Although there are lists of sustainability indicators already proposed for the brewing industry in general (Tokos et al., 2012), there has not been a list of indicators previously proposed for small brewers, or for craft breweries in Ontario. The proposed certification guideline found in Appendix 8 has an accompanying preliminary list of proposed indicators found in Appendix 1.

There are several pieces of knowledge emerging from research. The lack of resources and access to resources available to small brewers has emerged as a significant barrier, and a weakness challenging RBV resource benefits. The lack of knowledge faced by small brewers regarding management tools, practices, and projects has emerged as a significant challenge. Findings identify that there is significant room for craft breweries in

Ontario to improve sustainability performance. Estimated environmental impacts created by the craft brewing industry in Ontario within 2016 based on statistics from Beer Canada (2017) and the Ontario Craft Brewers (2017d) may be up to 4.2 million hectoliters of water, 57.8 million MJ of energy, 7.3 million kg of CO₂-e, 2 million kg of solid waste, and 3.7 million hectoliters of wastewater. The emerging challenge to balance accessibility, and stringency within certification requirements was very significant. The proposed certification offers a viable certification model that considers the challenges faced by craft brewers, addresses improving the impacts created by craft brewers, and balances accessibility and stringency.

Findings identify that some craft breweries in Ontario do have an interest to pursue sustainability certification. Existing codes and standards were found not to be applicable to craft breweries. The specific contributions this research offers are synthesized and applied within the proposed certification guideline in Appendix 8, and the accompanying list of indicators in Appendix 1.

The proposed certification guideline, and accompanying preliminary list of proposed indicators are important because they have the potential to be a RBV resource for Ontario craft brewers. The young, and growing craft brewing industry in Ontario may benefit from a sustained competitive advantage potentially offered through adopting sustainability certification. The proposed certification model also has the potential to improve CS performance in the craft brewing industry in Ontario if it is properly accepted and administered. If adopted, the proposed certification scheme may play a very small role in supporting sustainable development.

9.4 Limitations and Recommendations for Future Research

There were limitations within this research study. Limitations have previously been identified in this thesis. Limitations impacting research, and influencing future research will be reviewed, and suggestions will be made for future research.

Research did not consider all stakeholder groups. Interviews were limited to four craft breweries, and four certification administrators. Other emerging data came from literature review, and content analysis. Although these methods were able to achieve the research goals, they did not consider interests from local community groups, or from government organizations. All interviews were also held to 20 questions. The time constraints within the interviews did not allow for feedback from craft breweries, or certification administrators on the preliminary proposed list of indicators.

There are important topics that have not been resolved within the research and findings presented in this thesis. The requirements presented in the proposed certification should receive feedback through consultations with local community groups, and government actors. Performance assessment within the proposed certification for each tier will need to go through revision to establish appropriate tiers corresponding with performance. Future research will be required to properly identify relevant performance tiers. The optional indicators will need to be revised upon receiving feedback from civil, and industry actors. The proposed list of indicators may need to be changed to improve functionality, and improve relevance. Further indicators should be added to increase the breadth of topics covered, and include further supply chain considerations. In-line with

suggestions gained through informational interviews with certification administrators, the indicators should continue to go through further revision over a defined time period of one to five years to account for relevant updates.

Future research may also be directed towards the potential synergies between suppliers, producers, and retailers within the craft brewing industry in Ontario. Many retailers in Ontario engage in their own CSR, and CS management (Liquor Control Board of Ontario, 2017a; Loblaw, 2016; Sobeys, 2017). The possibility exists for partnerships between suppliers, producers and retailers. Preferred merchandising programs, such as the Liquor Control Board of Ontario's (2017b) "Green Shelf Extender" may offer benefits for CS certification for producers. More research may be directed towards the benefits of CS certification for all three of the above identified parties.

If the proposed certification is successfully adopted, future research may be focused on quantifying the performance improvement resulting from adopting the certification. On an industry-wide, and firm-specific scale, performance may be benchmarked before implementing certification, and assessed again after regular intervals. Congruent with information emerging from interviews with certification administrators, the overall performance of the certification should be reviewed at regular intervals.

Future research may identify best practices in relation to the size of the brewery. Suggestions emerged through interviews with craft breweries to identify best practices, and provide guidance on the project implementation in relation to the size of the craft

brewery. Identifying the brewery size relevant for each project would be helpful to guide small craft brewers through growth.

Quantified performance data relating to brewery size would be very helpful to move towards creating substantive policies within the proposed certifiable standard. Upon completing future research regarding performance benchmarking, future research may be directed to create categories based on performance data and brewery size. This information would enable substantive, prescriptive elements to be included within certification. Directing future research towards the inclusion of substantive and prescriptive policies or requirements may be useful.

The research presented in this thesis has established a solid framework for a self-regulatory sustainability certification scheme for the craft brewing industry in Ontario, and a list of relevant sustainability indicators. It should be acknowledged that the guidelines presented in this thesis are merely proposed. The proposed guidelines are not at the implementation stage. Similarly, indicators presented in Appendix 1 are merely proposed. The indicators will need further revision through feedback from industry, civil, and public stakeholders.

9.5 Concluding Remarks

Recent growth in the craft brewing industry in Ontario has built significant economic growth, and also raises social and environmental concerns. Governance theory suggests that self-regulation may significantly improve sustainability performance, and fill gaps

within public regulation. Adopting a self-regulatory sustainability certification scheme administered by the Ontario Craft Brewers Association may help improve sustainability performance within craft breweries in Ontario and address the lack of financial resources, and lack of knowledge resources faced by craft brewers. The proposed certification guideline and list of indicators offer a concrete opportunity for craft breweries in Ontario to improve sustainability performance and influence a sustained competitive advantage.

Appendix 1: Proposed Aspects and Indicators

Environmental Aspects and Indicators				
Aspect Categories	Qty	Type	Indicator	Source
1) water (input)		Required	water consumption volume	Olajire, 2012; Peel, 1999; Roca & Searcy, 2012; Sierra Nevada, 2015; Tokos et al., 2012
		Required	water consumption intensity	Roca & Searcy, 2012; Sierra Nevada, 2015
		Optional	water reduction projects	Sierra Nevada, 2015
Optional	1			
Required	2			
Total	3			
2) energy (input)		Required	electricity	Olajire, 2012; Roca & Searcy, 2012; Tokos et al., 2012
		Required	natural gas	Olajire, 2012
		Optional	coal	Olajire, 2012
		Required	total energy consumption	Roca & Searcy, 2012; Tokos et al., 2012; Sierra Nevada, 2015
		Required	energy intensity ratio	Roca & Searcy, 2012; Tokos et al., 2012; Sierra Nevada, 2015
		Optional	total renewable energy	Deschutes Brewery, 2015; Sierra Nevada, 2015
		Optional	energy improvement projects	Deschutes Brewery, 2015; Sierra Nevada, 2015
Optional	3			
Required	4			
Total	7			
3) solid waste (output)		Optional	spent grain	Olajire, 2012; Tokos et al., 2012
		Optional	hops	Olajire, 2012
		Optional	trub	Olajire, 2012
		Optional	sludge	Olajire, 2012
		Optional	surplus yeast	Olajire, 2012; Tokos et al., 2012
		Optional	diatomaceous earth	Olajire, 2012; Tokos et al., 2012
		Optional	packaging materials	Olajire, 2012
		Optional	hazardous waste	Olajire, 2012
		Optional	glass	Tokos et al., 2012
		Optional	paper	Tokos et al., 2012
		Optional	plastic	Tokos et al., 2012

		Optional	metal	Tokos et al., 2012
		Required	solid waste	Olajire, 2012; Roca & Searcy, 2012
		Required	solid waste intensity	Roca & Searcy, 2012
		Optional	solid waste reduction projects	Deschutes Brewery, 2015; Sierra Nevada, 2015
		Optional	waste diverted (fraction of total)	Sierra Nevada, 2015
Optional	14			
Required	2			
Total	16			
4) wastewater (output)		Required	wastewater volume	Olajire, 2012; Roca & Searcy, 2012; Tokos et al., 2012
		Optional	BOD	Olajire, 2012; Tokos et al., 2012
		Optional	COD	Olajire, 2012; Tokos et al., 2012
		Optional	nitrogen	Olajire, 2012; Tokos et al., 2012
		Optional	phosphorus	Olajire, 2012; Tokos et al., 2012
		Optional	pH per volume of beer	Olajire, 2012; Tokos et al., 2012
		Optional	suspended solids	Olajire, 2012; Tokos et al., 2012
		Required	wastewater volume intensity ratio	Tokos et al., 2012
		Optional	wastewater compliance	Roca & Searcy, 2012
Optional	7			
Required	2			
Total	9			
5) Air emissions (output)		Optional	CO2	Olajire, 2012; Roca & Searcy, 2012; Tokos et al., 2012
		Optional	nitrous oxide	Olajire, 2012; Tokos et al., 2012
		Optional	sulphur dioxide	Olajire, 2012; Roca & Searcy, 2012; Tokos et al., 2012
		Optional	CO2-e emissions by weight (Scope II & III)	Roca & Searcy, 2012; Tokos et al., 2012
		Required	CO2-e emissions by weight (Scope I)	Roca & Searcy, 2012; Tokos et al., 2012
		Required	GHG or CO2-e emissions intensity	Roca & Searcy, 2012
		Optional	emissions improvement projects	Sierra Nevada, 2015
Optional	5			
Required	2			
Total	7			

6) Materials		Optional	total materials used by weight	Peel, 1999; Roca & Searcy, 2012; Tokos et al., 2012
		Optional	percentage of materials that use recycled inputs	Tokos et al., 2012
		Optional	malt	Peel, 1999; Tokos et al., 2012
		Optional	hops	Peel, 1999
		Required	percentage of local suppliers	Deschutes Brewery, 2015
Optional	4			
Required	1			
Total	5			
7) Transportation		Required	methods of transportation used for distribution	Sierra Nevada, 2015
Optional	0			
Required	1			
Total	1			
8) Other		Optional	number of planted trees	Roca & Searcy, 2012
Optional	1			
Required	0			
Total	1			
Total Environmental	95			
Social Aspects and Indicators				
Major Aspect Categories	Qty		Indicator	Source
1) Local community		Optional	stress on municipal water (complaints)	Olajire, 2012
		Optional	noise (complaints)	Olajire, 2012
		Optional	smell (complaints)	Olajire, 2012
		Optional	stress on municipal wastewater treatment (complaints)	Olajire, 2012
		Required	donations, sponsorships, and investments in community	Deschutes Brewery, 2015; Roca & Searcy, 2012; Sierra Nevada, 2015
Optional	4			
Required	1			
Total	5			
2) Employment		Required	total number of employees	Roca & Searcy, 2012; Tokos et al., 2012
		Optional	number of full time employees per volume of	Tokos et al., 2012

			beer	
		Optional	number of part time employees per volume of beer	Tokos et al., 2012
		Optional	total number of injuries	Roca & Searcy, 2012; Tokos et al., 2012
		Optional	number of male employees per volume of beer	Tokos et al., 2012
		Optional	number of female employees	Roca & Searcy, 2012; Tokos et al., 2012
		Optional	average age of workers per volume of beer	Tokos et al., 2012
		Optional	fraction of visible minorities	Roca & Searcy, 2012
		Optional	employee turnover rate	Roca & Searcy, 2012
		Required	number of health and safety incidents/injuries	Roca & Searcy, 2012
		Required	number of employee wellness and support programs	Sierra Nevada, 2015
Optional	8			
Required	3			
Total	11			
3) Governance		Required	commitment from top-level decision maker to sustainability	Deschutes Brewery, 2015; Sierra Nevada, 2015
		Optional	position designated to manage sustainability	Deschutes Brewery, 2015; Sierra Nevada, 2015
		Optional	sustainability-related certifications	Sierra Nevada, 2015
		Optional	number of regulatory notifications or fines	Roca & Searcy, 2012
		Optional	number of audits	Roca & Searcy, 2012
Optional	4			
Required	1			
Total	5			
Optional Social	16			
Required Social	5			
Total Social	21			
Optional Environmental	35			
Required	14			

Environmental		
Total Environmental	49	
Total Optional Environmental & Social	51	
Total Required Environmental & Social	19	
Total Combined Indicators	70	

Appendix 2: Results from Quantitative Content Analysis of Standards and Codes

Categories					Quantity
Total number of schemes					465
Potentially industry-relevant schemes available in English in Ontario					64
1) Performance-related schemes					5
2) Performance related schemes for a single aspect					25
3) Product related Schemes					9
4) Other certifications					25
5) Total enterprise sustainability certifications relevant to the craft brewing industry in Ontario					0
Category 1	Category 2	Category 3	Category 4	Category 5	
Performance	Single Aspect	Product	Enterprise	Other	Website
				Acorn Scheme	http://ems.iema.net/acorn_scheme
				Audobon International	http://www.auduboninternational.org/partners-for-the-environment
				B Corp	http://www.bcorporation.net/become-a-b-corp/how-to-become-a-b-corp/performance-requirements
				Beluga	http://www.beluga.is/displayer.asp?Article_type=News&p=ASP\Pg0.asp
				Canada organic	http://www.inspection.gc.ca/food/organic-products/eng/1300139461200/1300140373901
				Canadian Certified Environmental Professional	http://www.cecab.org/public/default.aspx
	Carbon care certification				http://www.enviroaccess.ca/expert-conseil/en/carbon-care-certification/
	carbon footprint of				https://www.cfp-japan.jp/english/

	products				
	Carbon free certified				https://carbonfund.org/product-certification/
	Carbon neutral Certified Global Standard				http://www.carbonneutral.com/
	Carbon neutral certification				http://www.ecolabelindex.com/ecolabel/carbon-neutral-certification
	Carbon neutral product certification				http://www.ecolabelindex.com/ecolabel/carbon-neutral-products
	Carbon footprint certification				https://www.carbontrust.com/client-services/footprinting/footprint-certification/carbon-reduction-label
		Carbon Trust Standard			https://www.carbontrust.com/client-services/footprinting/footprint-certification/carbon-reduction-label
	Carbon Zero				http://www.ecolabelindex.com/ecolabel/carbonzero
	CEMARS				http://www.ecolabelindex.com/ecolabel/cemars-certified-emissions-measurement-and-reduction-scheme
				Certified Vegan	http://vegan.org/
	Cleaner and Greener				http://www.cleanerandgreener.org/
	Climate Registry				http://www.theclimateregistry.org/
	Climatop				https://www.myclimate.org/de/firmenkunden/climatop-label/
		cradle 2 cradle			http://www.ecolabelindex.com/ecolabel/cradle-to-cradle-certification
				Earthright Business certification	

Earthsure					http://www.ecolabelindex.com/ecolabel/earthsure
		EcoLeaf			http://www.ecoleaf-jemai.jp/eng/
		EcoLogo			http://industries.ul.com/environment/certificationvalidation-marks/ecologo-product-certification
				ECO Warranty	http://intlcert.com/environmental-management/
				EMAS	http://ec.europa.eu/environment/emas/index_en.htm
		EPD			http://www.environdec.com/
				FedEx EarthSmart Solutions	http://www.ecolabelindex.com/ecolabel/Fedex
				Food Alliance Certification	http://foodalliance.org/
	Global Recycle Standard				http://textileexchange.org/wp-content/uploads/2016/01/Global-Recycle-Standard-V2.1.pdf
				Good Shopping guide Ethical Award	http://ethical-company-organisation.org/
Green Business Certification					http://www.gbb.org/product-tour/
				Green business league	http://www.greenbusinessleague.com/
Green Circle Certified					http://www.greencirclecertified.com/
	Green-e Energy				http://www.green-e.org/getcert_re.shtml
	Green-e Marketplace				http://www.green-e.org/getcert_bus_what.shtml
Green Leaf Eco Standard					http://www.greenleafecostandard.net/
Green					http://www.greenworkplace.c

Workplace Certification - Seal of Good Practice					a/certification/
		Green Seal			http://www.greenseal.org/
	Green Shield Certified				http://www.greenshieldcertified.org/
				Green Table Network	http://greentable.net/home/join/
		Green Tick Certification			http://www.greentick.com/
				IMO Certified	http://www.imo.ch/logicio/pmws/indexDOM.php?client_id=imo&page_id=home&lang_iso639=en
				Just.	http://justorganizations.com/
	Low CO2 Certification				http://noco2.com.au/certify/business/LowCO2-low-carbon-certification
				Max Havelaar	http://www.ecolabelindex.com/ecolabel/max-havelaar
	NoCO2				http://www.ecolabelindex.com/ecolabel/noco2
	Planet Positive				http://www.ecolabelindex.com/ecolabel/planet-positive
	Processed Chlorine Free				http://www.ecolabelindex.com/ecolabel/processed-chlorine-free
				rainforest alliance certified	http://www.ecolabelindex.com/ecolabel/rainforest-alliance-certified
				Recycled content.	http://www.ecolabelindex.com/ecolabel/recycled-content
	RenewablePLUS				http://www.ecolabelindex.com/ecolabel/renewableplus
				SEE what you are buying into	
				SIRIM certification	
				Sourcemap	http://www.ecolabelindex.com/ecolabel/sourcemap
				UL Environment	http://www.ecolabelindex.com/ecolabel/ul-

				tal Claim Validation	environmental-claim- validation
		UL Environme nt Multi- Attribute Certificatio n			
	UPS Carbon Neutral				http://www.ecolabelindex.com/ecolabel/ups-carbon-neutral
	UPS Eco Responsible Packaging				http://www.ecolabelindex.com/ecolabel/ups-eco-responsible-packaging-program
	Verified carbon standard				http://www.ecolabelindex.com/ecolabel/verified-carbon-standard
		Vitality Leaf			http://www.ecolabelindex.com/ecolabel/vitality-leaf
				Whole Trade Guarantee	http://www.ecolabelindex.com/ecolabel/whole-trade-guarantee
	WindMade				http://www.ecolabelindex.com/ecolabel/WindMade

Appendix 3: List of Small Ontario Breweries

List of brewery names originally retrieved from Ontario Ministry of Finance (2017).

Manufacturer's Name	Website	Commitment Mentioned
1300301 Ontario Limited o/a Amber Brewery	amberbrewery.ca/	
1451285 ONTARIO LTD.	NA	
1885801 Ontario Inc. o/a Bancroft Brewery	www.bancroftbrewing.ca/	
1886923 Ontario Ltd. o/a Mash Paddle Brewing Co.	mashpaddlebrewing.com/	
1918294 Ontario Ltd. o/a Presq'uile Brewery	NA	
2234685 Ontario Inc., o/a Niagara Brewing Company	https://niagarabrewingcompany.com/	
2235540 Ontario Inc. o/a The Old Mill Pub at Ashton	http://www.ashtonbrewingcompany.com/	
2401155 Ontario Inc. o/a Burdock	burdockto.com/	
2420191 ONTARIO INC. o/a O-FRESH BREWERY	NA	
2423891 Ontario Inc. o/a North Bay Beerworks	NA	
2446039 Ontario Inc.	NA	
2475789 Ontario Inc. o/a Southpaw Beverage Company	southpawbev.com/	
2506449 Ontario Inc. o/a Wooden Horse Brewing Co.	https://www.woodenhorsebrewing.com/	
2510530 Ontario Inc. o/a Northern Maverick Gastro Brewery	https://northernmaverick.ca/	
2516202 Ontario Inc. o/a Kingsville Brewing Co.	NA	
4 Aces Consulting Ltd. o/a Bomb Brewing Company	NA	
5 Paddles Brewing Company Inc.	https://www.5paddlesbrewing.ca/	
555 Brewing Corporation o/a 555 Brewing Co.	NA	
7561393 Canada Inc. o/a Kings Town Beer Company	www.kingstownbeerco.ca/	

8498784 Canada Inc., Bierbrier	bierbrier.com/	
9110224 Canada Corporation o/a Walsh WiltshireBrewing Co.	NA	
9181563 Canada Inc. o/a Bandit Brewery	banditbrewery.ca/	
Abe Erb Brew Co.	abeerb.com/	
Ace Hill Beer Company Inc.	https://acehillbeer.com/	
Adrian Vernon Homer o/a Homer's	NA	
All Or Nothing Brewhouse Inc.	allornothing.beer/	
Amsterdam Brewing Company	www.amsterdambeer.com/	
Anderson Craft Ales Ltd.	andersoncraftales.ca/	
Arch Brewing Company Inc.	www.archbrewing.ca/	
Bad Apple Brewing Company Ltd.	badapplebrewingco.ca/	
Bamboo Beer Limited	bamboobeer.ca/	Yes
Barley Days Brewery	https://www.barleydaysbrewery.com/	
Barncat Artisan Ales Inc.	https://barncatales.com/	
Barnstormer Brewing and Pizzeria	https://www.barnstormerbrewing.com/	
Bayside Brewing Co. Limited	baysidebrewing.com/	
Beau's All Natural Brewing Co.	https://beaus.ca/	Yes
Beauty Brewing Co.	www.beautybeer.ca/	
Bell City Brewing Company Inc.	bellcitybrewing.com/	
Bellwoods Brewery Inc.	www.bellwoodsbrewery.com/	
Bevin Palmateer, Brew	NA	
Beyond the Pale Brewing Company	beyondthepale.ca/	
BICYCLE CRAFT BREWERY INC.	www.bicyclecraftbrewery.ca/	
Big Rideau Brewing Company Inc.	NA	
Big Rig Brewery	http://bigrigbrewery.com/	
Big Rock Brewery	https://bigrockbeer.com/	
BITTE SCHON BRAUHAUS INC	https://www.bitteschonbrauhaus.com/	
Black Donnelly's Brewing Company Ltd.	www.black-donnelys.com/	
Black Oak Brewing Company Limited	www.blackoakbeer.com/	
Black Swan Brewing Company Inc.	www.blackswanbrewing.ca/	
Block Three Brewing Company Inc.	https://www.blockthreebrewing.com/	
Blood Brothers Brewing Inc.	www.bloodbrothersbrewing.com/	
BLYTH BREWING & DISTILLING	cowbellbrewing.com/	

INC.		
Bobcaygeon Brewing Company Ltd.	bobcaygeonbrewing.ca/	
BOSHKUNG BREWING COMPANY INC	boshkungbrewing.com/	
Brasserie Des Quatre Lunes Ltd. o/a Four Moons Brewery	NA	
Brasserie Etienne Brule Inc.	www.etiennebrule.ca/	
Brasserie Tuque de Broue Brewery Inc.	tuquedebroue.ca/fr/	
Brew, Bevin Palmateer	NA	
Brian Beatty o/a Horshoe Valley Brewing Company	www.hvbrewco.com/	
Brimstone Brewing Company Inc.	www.brimstonebrewing.ca/	
Broadhead Brewing Company Ltd.	broadheadbeer.com/	
Brock Street Brewing Company	www.brockstreetbrewing.com/	
Broken Stick Brewing Company Ltd.	www.brokenstickbrewing.com/	
BROTHERS BREWING COMPANY INC.	www.brothersbrewingcompany.ca/	
Brown Van Brewing Corp.	brownvanbrewing.com/	
Bruce Halstead o/a Durham Brewing Company	NA	
Brunswick Bier Works Inc.	www.brunswickbierworks.com/	
Bush Pilot Brewing Company	bushpilotbrewing.com/	
Calabogie Brewing Co. Ltd.	calabogiebrewingco.ca/	
Caledon Hills Brewing Company Inc.	caledonhillsbrewing.ca/	
Cameron's Brewing Company	www.cameronsbrewing.com/	
Carl Pratt o/a Beaches Brewing Company	NA	
CARTWRIGHT SPRINGS BREWERY INCORPORATED	csbeer.ca/	
Cassel Brewery Company Ltd.	casselbrewery.ca/	
Cheetah International Brewers Inc.	NA	
Church-Key Brewing Company Ltd.	www.churchkeybrewing.com/	
Clear Lake Brewing Company Limited	NA	

Clifford Brewing Company	www.cliffordbrewing.com/	
Colio Estate Wines Inc. o/a Thornbury Villiage Brewery	thornburycraft.com/	
Collective Arts Brewing Limited	collectiveartsbrewing.com/	
Cool Beer Brewing Co.	www.coolbeer.com/	
Cool India Brewing Company Ltd.	coolindiabrewing.com/	
County Road Beer Company Inc.	https://www.countyrdbeer.com/	
Craft Brewers Coalition Inc. o/a Common Good Beer Company	https://commongoodbeer.com/	
Craft Heads Brewing Company Inc.	www.craftheads.ca/	
Creemore Springs Brewery Ltd.	NA	
Crimson Canary Brewers Ltd.	NA	
Crooked Mile Brewing Company Inc.	crookedmile.ca/	
David Frederick o/a Strange Brewing Company (The)	http://strangecraft.com/	
David Wingfelder o/a Sextant Craft Brewery	NA	
Dawson Trail Craft Brewery Inc.	www.dawsontrailcraftbrewery.com/	
Descendants Beer & Beverage Company Ltd.	https://www.descendantsbeer.com/	
Domaine Darius Limited o/a Domain Darius	NA	
DOMINION CITY BREWING COMPANY INC.	http://www.dominioncity.ca/	YES
DOUBLE TROUBLE BREWING INC.	doubletroublebrewing.com/	
EAST END BREW CO.	www.eastendbrewing.com/	
Eastbound Brewing Company Inc.	www.eastboundbeer.com/	
Elora Brewing Company, Inc.	elorabrewingcompany.ca/	
Evergreen Craft Ales Inc.	http://www.evergreencraftales.com/	
Fairweather Brewing Company Inc.	fairweatherbrewing.com/	
Falcon Brewing Company Inc.	www.falconbeer.beer/	
Flying Monkeys Craft Brewery Limited	www.flyingmonkeys.ca/	
Forked River Brewing Company	www.forkedriverbrewing.com/	
Forty Thieves Brewing	NA	
Full Beard Brewing Company Inc.	https://fullbeardbrewing.com/	
Gananoque Brewing Company Ltd.	www.ganbeer.com/	

Gateway Brewing Company	NA	
Godspeed Brewery Inc. o/a Godspeed Brewery	NA	
Gold Crown Brewery	NA	
Goodlot Farmstead Brewing Company Limited	NA	
Grain & Grit Ltd.	www.grainandgritbeer.com/	
Grand River Brewery	grandriverbrewing.com/where-to-buy/	
Great Lakes Brewing Co. Inc.	www.greatlakesbeer.com/	
HABITS GASTROPUB INC. O/A FOLLY BREWING	https://www.follybrewing.com/	
Haliburton Highlands Brewing	haliburtonhighlandsbrewing.ca/	Yes
Halo Brewery Inc.	https://halobrewery.com/	
Hancock Micro Brewery Ltd.	NA	
Heritage Brewing Limited	NA	
High Park Brewery Ltd.	NA	
High Road Brewing Company Ltd.	NA	
Highlander Brew Co.	https://www.highlanderbrewco.com	
Hockley Valley Brewing Company Inc.	www.hockleybeer.ca/	
Hogsback Brewing Company Inc.	hogsback.ca/	
Hogtown Brewers Inc.	hogtownbrewers.ca/	
HOMETOWN BREW CO.	https://www.hometownbrew.com/	
Indie Alehouse (The)	www.indiealehouse.com/	
Innocente Brewing Company	www.innocente.ca/	
J. Picard Brewing Limited	NA	
Johnstown Craft Beverages Inc. o/a Windmill Brewery	windmillbrewery.ca/	
Julie Bearcroft & Norman Bearcroft o/a Belmont Lake Brewery	NA	
Junction Craft Brewing	www.junctioncraftbrewing.com/	
Kame & Kettle Beer Works Inc.	www.kameandkettle.ca/	
Katalyst Brewing Company Inc.	NA	
Katlyn Anderson & Ayden Gautreau o/a Shakespeare Brewing Company	https://www.shakespearebrewingcompany.ca/	
Kilannan Brewing Company	www.kilannanbrewing.ca/	
King Brewery	https://www.kingbrewery.ca/	
Kingston Brewing Company Limited	https://www.kingstonbrewing.ca/	

Kyle Teichert o/a Half Hours on Earth	www.halfhoursonearth.com/	
Lake of Bays Brewing Company Limited	lakeofbaysbrewing.ca/	
Lake of the Woods Brewing Company	http://www.lowbrewco.com/	
Lake on the Mountain Resort (1996) Inc. o/a Lake on the Mountain Brewing Company	lakeonthemountain.com/brewery/	
LAKE WILCOX BREWING COMPANY LTD.	www.lakewilcoxbrewing.com/	
Lakes of Muskoka Cottage Brewery	https://muskokabrewery.com/	
Left Field Brewery Inc.	www.leftfieldbrewery.ca/	
Liberty Village Brewing Company Ltd.	https://libertyvillagebeer.com/	
Lock Street Brewing Corporation o/a Lock Street Brewing Company	NA	
LOD Brew Inc. o/a Lod Brew	NA	
LONDON BREWING CO-OPERATIVE INC.	londonbrewing.ca/	
LONGSLICE BREWERY INC.	longslice.com/	
Lost Craft Inc.	https://lostcraft.ca/	
Lowertown Brewery Inc.	www.lowertownbrewery.ca/	
Mackinnon Brewing and Distilling Ltd.	http://www.mackinnonbrewing.com	
MACLEAN'S ALES INC.	macleansales.ca/	
Madison Brewing Co.	NA	
Magnotta Brewery (Vaughan) Ltd.	www.magnottabrewery.com/	
Malt Aroma Brewery Ltd	NA	
Manantler Craft Brewing Co.	www.manantler.com/	
MANITOULIN BREWING COMPANY INC	www.manitoulinbrewing.co/	
Maple Beer Company Inc.	NA	
Market Brewing Company Ltd.	https://marketbrewingco.com/	
Mascot Brewery Inc.	www.mascotbrewery.com/	
Merit Brewing Company Inc.	www.meritbrewing.ca/	
Micheal Corrie o/a Stone House Brewing Company	www.stonehousebrewing.ca/	
Midian Brewing Company	NA	
Midtown Brewing Company Inc.	NA	

Mill Street Brewery	NA	
MUDDY YORK BREWING COMPANY	www.muddyorkbrewing.com/	
NAC Importers Inc. o/a North American Craft	northamericancraft.ca/	
Nathan Card o/a Wild Card Brewing Company	wildcardbrewco.com/	
Neustadt Springs Brewery Ltd.	neustadtsprings.com/	
New Limburg Brewing Company Ltd.	newlimburg.com/	
New Ontario Brewing Company Inc.	www.newontariobrewing.com/	
Niagara College Learning Enterprise Corporation	http://www.ncteachingbrewery.ca/	
Niagara Oast House Brewers	https://oasthousebrewers.com/	
Niagara's Best Brewery & Pub	niagarabrewingcompany.com	
Nickel Brook Brewing Company Inc.	https://nickelbrook.com/	
Nita Beer Company Inc.	https://nitabeer.com/	
Nitty's Food Services Limited, o/a Toboggan Brewing Company	www.tobogganbrewing.com/	
NORSE BREWERY INC.	norsebrewery.com	
North Works Brewing Company Inc.	NA	
Northern Superior Brewing Company Inc.	northernsuperior.org/	
NORTHUMBERLAND HILLS BREWERY	NA	
Northwinds Brewery Ltd.	northwindsbrewery.com/	
Old Credit Brewing Co. Ltd.	www.oldcreditbrewing.com/	
Old Flame	NA	
Old Flame Brewing Co. Ltd.	www.oldflamebrewingco.ca/	
Old Tomorrow Ltd.	www.oldtomorrow.com/	
Ontario Beer Company Ltd.	NA	
Orange Snail Brewers	orangesnailbrewers.ca/	
Orange Snail Brewers Ltd	orangesnailbrewers.ca/	
Outlaw Brew Co. Inc.	www.outlawbrewco.ca/	
Outspoken Brewing Inc.	https://www.outspokenbrewing.com/	
Paola O. Ferrante, Matthew J. Di Iorio o/a Draught Dodger	NA	
Parsons Brewing Co.	https://www.parsonsbrewing.com/	

Perth Brewery Ltd.	www.perthbrewery.ca/	
Pints Pursuits Brewing Company Inc.	pintpursuits.com/	
Pioneer Brewery Ltd.	NA	
Pitschfork Brewing Corp.	www.pitschforkbrewing.com/	
Plan B Beer Works Inc.	www.planbbeer.ca/	
Practically Irish Brewing Inc.	NA	
Prince Eddy's Brewing Company Ltd.	www.princeeddys.com/	
Propeller Brewing Company (Ontario)	NA	
Q4Q Beer Company Ltd.	NA	
Radical Road Brewing Company Inc.	radicalroadbrew.com/	
Railway City Brewing Company Ltd.	www.railwaycitybrewing.com/	
Rainhard Brewing Company Inc.	rainhardbrewing.com/	
Red Thread Brewing Corp.	https://rtbrewing.ca/	
Redline Brewhouse Inc.	www.redlinebrewhouse.com/	
Refined Fool Brewing Company Inc.	https://www.refinedfool.com/	
Riverhead Brewing Company Ltd.	https://www.riverheadbrewing.com/	
RORSCHACH BREWING INC.	https://www.rorschachbrewing.com/	
ROUGE RIVER BREWING COMPANY INC	www.rougeriverbrewingcompany.com/	
Royal City Brewing Company Inc.	www.royalcitybrew.ca/	
Rurban Brewing Ltd.	www.rurbanbrewing.com/	
Saulter Street Brewery Inc.	https://www.saulterstreetbrewery.com/	
Sawdust City Brewing Company Inc.	www.sawdustcitybrewing.com	yes
Sean Walpole o/a The William Street Beer Company	williamstreetbeer.com/	
Shacklands Brewing Co. Ltd.	www.shacklands.com/	
Shawn Lepage o/a Purple Skull Brewing Company	www.purpleskullbrewingco.com/	
Shed Brewing Company Ltd.	lagershed.com/	
SHILLOW BEER COMPANY INC.	www.shillowbeer.com/about.html	
Side Launch Brewing Company Inc.	https://www.sidelaunchbrewing.com/	
Silversmith Brewing Company Limited	www.silversmithbrewing.com/	

Skeena Brewing Company	www.skeenabrewing.com/	
Sleeping Giant Brewing Co. Limited	https://www.sleepinggiantbrewing.ca/	Yes
Small Pony Barrel Works Inc.	www.smallponybarrelworks.com/	
Smithavens Brewing Company Ltd.	www.smithavensbrewing.ca/	
Smithworks Brewing Company Ltd.	www.smithworksbrewing.ca/	
Sons of Kent Brewing Company Ltd.	NA	
Spearhead Brewing Co. Limited	www.spearheadbeer.com/	
Split Rail Brewing Company Inc.	www.splitrailmanitoulin.com/	
Square Brew Inc. o/a Square Brew	www.squarebrewco.com/	
Square Timber Brewing Company	www.squaretimber.com/	
St. Mary Axe Inc.	https://www.stmaryaxe.ca/	
Stack Brewing Corp.	https://www.stackbrewing.ca/	
Stalwart Brewing Company Ltd	www.stalwartbrewing.ca/	
Steam Whistle Brewing	steamwhistle.ca	yes
STONE CITY ALES INC.	NA	
Stonehammer Brewing	www.stonehammer.ca/	
Stratford Brewing Company	www.stratfordbrewing.com/	
Strathroy Brewing Company Inc.	strathroybrewingcompany.ca/	
Stray Dog Brewing Company Inc.	https://stray-dog-brewing.myshopify.com/	
Sweetgrass Brewing Company	https://www.sweetgrassbeer.com/	
Tankhouse Developments Inc. o/a Signal Brewing Company	NA	
Taps Brewing Company Inc	tapsbeer.ca/	
TBGOLF Inc.	www.triplebogey.com/	
Tecumseh Brewing Co. Ltd.	www.tecumsehbrewingco.com/	
The Blue Elephant Inc.	blueelephant.ca/	
The Clocktower Brew Pub Ltd.	clocktower.ca/	
The Collingwood Brewery Ltd.	www.thecollingwoodbrewery.com/	
The Covered Bridge Brewing Company Inc.	www.coveredbridgebrewing.com	
The Exchange Brewery Inc.	exchangebrewery.com/	
The Granite Brewery Ontario Inc.	www.granitebrewery.ca/	
The Hamilton Brewery Inc.	thehamiltonbrewery.com/	
The Kensington Brewing Company Inc.	https://www.kensingtonbrewingcompany.com/	
The Napanee Beer Company Inc.	https://napaneebeer.ca/	

The Partnership of John Philip Davis and Edward Michael Carter o/a Danforth Brewery	www.danforthbrewery.com/	
The Second Wedge Brewing Co.	https://thesecondwedge.ca/	
Together We're Bitter Co-Operative Brewing Inc.	www.brewing.coop/	
Tooth and Nail Brewing Inc	https://toothandnailbeer.com/	
Trafalgar Ales and Meads Ltd.	NA	
Tread Brewing	NA	
Trestle Brewing Company Limited	trestlecraftbeer.ca/	
Trevor Mathew Yvon Lehoux o/a Skeleton Park Brewery	www.skeletonpark.ca/	
Turtle Island Brewing Co. Ltd.	www.turtleislandbrewing.com/	
TVBC Holdings Inc (the Publication House Brewery)	NA	
Twenty Bench Brewing Company Inc.	benchbrewing.com/	
Union Jack Brewing Company Ltd.	www.unionjackbrewing.ca/	
Upper Thames Brewing Company Limited	upperthamesbrewing.ca/	
Versus Beer Company Inc.	NA	
Victor Leonard North, Garden Brewers	https://gardenbrewers.ca/	
Vimy Brewing Company Ltd.	www.vimybrewing.ca/	
Walkerville Brewery	walkervillebrewery.com	
Waller St. Brewing Inc.	www.wallerst.ca/	
Wasaga Beach Brewing Co.	wasaga.beer/	
Weather Brewery Ltd.	NA	
Wellington County Brewery Inc.	www.wellingtonbrewery.ca/	
Whipsnapr Brewing Co. Inc.	whipsnaprbrewingco.com/	
WhiskeyJack Beer Company Ltd.	NA	
Whitewater Brewing Company	whitewaterbeer.ca/	
WOLFE ISLAND SPRING CRAFT BREWERY INC.	NA	
Wolfhead Distillery Inc. o/a Lonsbery Farms Brewing Company	www.lonsberyfarms.beer/	
WOODHOUSE BREWING CO. INC.	www.woodhousebrewing.com/	

Appendix 4: Recruitment Email to Craft Breweries

"Hello [name of addressee],

My name is Chris Boerger, I'm a Sustainability Professional pursuing research with Ryerson University to develop a sustainability certification for the Craft Brewing Industry in Ontario.

I'm requesting input from environmental managers and sustainability leaders within the Craft Brewing industry, which is why I'm reaching out. If you're interested to learn more about the project, or to organize a phone call to offer input, simply respond to this email.

All research is being conducted to fulfill requirements of a graduate degree in the department of Environmental Applied Science and Management. All research is under the supervision of Dr. Kernaghan Webb.

Kind Regards,

Chris Boerger

Additional Information

Study Name: Corporate Sustainability and Self-Regulation in the Brewing Industry:
Sustainability Certification for Small Brewers in Ontario.

Purpose: Identify elements necessary for a successful sustainability certification scheme for Ontario Craft Brewers

Participation: Open to Craft Brewers with Operation within Ontario that have a sustainability program.

What: 20 minute interview/discussion about sustainability and certification

This research study has been reviewed by the Ryerson Research Ethics Board."

Appendix 5: Recruitment Email to Certification Administrators

"Hello name of addressee,

My name is Chris Boerger, I'm a Sustainability Professional pursuing research with Ryerson University to develop a sustainability certification scheme for the Craft Brewing Industry in Ontario. In combination with input from industry leaders, your input would be invaluable to the process. I'd like to organize a short phone call at your convenience, if you're available this week I would be happy to accommodate your schedule.

All research is being conducted to fulfill requirements of a graduate degree in the department of Environmental Applied Science and Management. All research is under the supervision of Dr. Kernaghan Webb.

Kind Regards,

Chris Boerger

Additional Information

Study Name: Corporate Sustainability and Self-Regulation in the Brewing Industry: Sustainability Certification for Small Brewers in Ontario.

Purpose: Identify elements necessary for a successful sustainability certification scheme that may be relevant in the Ontario Craft Brewing industry.

Participation: Open to organizations that offer and industry-specific sustainability certification.

What: 20 minute interview/discussion about sustainability certification.

This research study has been reviewed by the Ryerson Research Ethics Board.”

Appendix 6: Interviews with Ontario Craft Breweries

The following 20 Questions were asked to representatives from four separate craft breweries in Ontario. All interviews were held in 2017. Following each question is the response of each member.

1. Does your firm have between 1-50 employees, 50-100 employees, or more than 100 employees?

Interviewee 1: More than 100

Interviewee 2: More than 100

Interviewee 3: 1-50

Interviewee 4: 1-50

2. Does your firm produce between 1 and 30,000 hectolitres, 30,000 and 100,000, or more than 100,000 hectolitres annually?

Interviewee 1: Between 30,000 and 100,000

Interviewee 2: Between 30,000 and 100,000

Interviewee 3: 1-30,000

Interviewee 4: 1-30,000

3. How long has your firm had a commitment to CSR/CS/environmental management?

Interviewee 1: Since inception

Interviewee 2: More than 10 years

Interviewee 3: From the beginning; it's a primary cornerstone.

Interviewee 4: Since the design of the building 4 years ago.

4. Do you have a commitment to CSR/CS/environmental management from the top-level decision maker? Do you have a position designated to manage sustainability?

Interviewee 1: Yes, it's one of our tenants to be sustainable, We have an unofficial position to manage sustainability.

Interviewee 2: Yes, and yes.

Interviewee 3: Yes, and yes.

Interviewee 4: Yes, and yes. We have an environmental engineer responsible for water, wastewater, energy, and [air] emissions.

5. Do you have an environmental management system (EMS)? If not, have you defined materiality and set goals and targets for each aspect?

Interviewee 1: No EMS. Do track some metrics through quality management.

Interviewee 2: Nothing formal, and no certification, ISO is too expensive and doesn't fit.

Have identified some aspects, and have not set any goals or targets.

Interviewee 3: No EMS. We use excel to track data. Still establishing baseline after moving to new facility. Provincial funding from outset would help (not just for retrofit).

Interviewee 4: No ISO, or formal EMS. Working with third party engineering firm to quantify emissions, and sequester carbon on-site.

6. Can you describe the decision making tools used to support CSR/CS/environmental management?

Interviewee 1: Data collection informs decision makers, and restrictions regarding organic certification.

Interviewee 2: Everyone in the company know about our initiatives, it's included in training.

Interviewee 3: It was a strategic design and implementation decision [to manage water and wastewater]. Wastewater was made a priority, energy is a secondary focus.

Interviewee 4: We're partnering with an industry third party engineering firm, and another private organization for benchmarking.

7. Can you describe your data collection methods?

Interviewee 1: Some info taken from utility bills, and some taken from ERP system.

Interviewee 2: Internal metrics through invoices and bills. Only recently started collecting wastewater data including pH monitoring. It's more impactful to look upstream. Legislation doesn't make sense regarding water consumption and wastewater. Municipality wants lower water use, but lower water use increases concentrations. Municipality wants lower concentrations.

Interviewee 3: Flow meter [for wastewater] checked weekly, the rest from utility bills.

Interviewee 4: Flow meters for water and wastewater. Wastewater samples done 3 times a week. The rest is from utility bills.

8. Do you have a budget for CSR/CS/environmental management?

Interviewee 1: Not right now. Project by project.

Interviewee 2: Nothing official

Interviewee 3: No

Interviewee 4: It's project by project. There will be a formal budget in the future.

9. Do you publicly communicate CSR/CS/environmental management efforts?

Interviewee 1: Yes.

Interviewee 2: Not official, but we do include it within communications, and there is information on our blog and website.

Interviewee 3: Yes

Interviewee 4: Yes, on the website. We will also have a digital platform at the brewery that customers can view water, energy, and carbon use [efficiency ratios].

10. Do you find or expect there is a financial return resulting from CS communication efforts?

Interviewee 1: Consumer loyalty helps. People really like what we're doing with our brand, when they see they're doing what we say we're doing.

Interviewee 2: No idea

Interviewee 3: It's important to customers. It's an important differentiator.

Interviewee 4: Yes, we made a commitment to purchase equipment with higher efficiency rating that we expect to have a 1 ½ - 2 year return. We believe society in general is moving in this direction. Our interest is also a moral obligation.

11. What is the business case for your firm to adopt CS management?

Interviewee 1: Consumer loyalty, efficient operations, lowering enviro impact, circular economy, less waste, reusable materials, and less utilities.

Interviewee 2: Efficiency should be top of mind. There are more factors in the brewing industry than there are in traditional manufacturers.

Interviewee 3: It's a differentiator. It's critical based on rural location [referring to wastewater and water management].

Interviewee 4: NA

12. Are you certified with any ecolabels, or sustainability certification schemes (not EMS)?

Interviewee 1: Yes, organic certification and other.

Interviewee 2: No, it doesn't financially make sense. The cost could go towards more beneficial projects.

Interviewee 3: Nope

Interviewee 4: Nothing right now. In the future we will register for anything that we can register for. This program will help.

13. Does your CS management have any external assurance of any kind (EMS considered)?

Interviewee 1: Yes, for organic.

Interviewee 2: No.

Interviewee 3: No.

Interviewee 4: No.

14. Considering there is a consumer Willingness to Pay (WTP) in other food processing industries, do you think there would be a consumer WTP for sustainability certification?

Interviewee 1: Ya, I think so.

Interviewee 2: Fits well with craft messaging (high quality). Ya, it should be tied in.

Interviewee 3: Could like to think so. Organic certification shows a WTP, so I think so.

Interviewee 4: Not sure, but maybe. It would depend on what the commitment is [a more stringent commitment would be more likely to have a return].

15. Would you consider adopting enterprise-level sustainability certification?

Interviewee 1: Certification would improve efficiency, and it wouldn't make sense to certify just one product.

Interviewee 2: Always interested, but it would need to make sense.

Interviewee 3: Yes.

Interviewee 4: Yes.

16. Do you think an annual sustainability report would be accessible for all breweries to comply with?

Interviewee 1: Yes, a report might hold more weight than an audit. Audit just gets pass or fail, report includes public communication.

Interviewee 2: It may not be as stringent as other schemes out there. It would have to be accessible for brewers though. If it achieved buy-in, it would have to include a mechanism for performance evaluation, and comparison. It would be good to have separate groups based on production volume.

Interviewee 3: Depends on how it's structured.

Interviewee 4: Yes.

17. If so, what do you think it should include?

Interviewee 1: Not sure

Interviewee 2: Performance evaluation, it should be tiered, and comparable.

Interviewee 3: -Certification needs to mean something. Maybe it could have a range of categories. There could be different best practices for different sized firms. Breweries could achieve different levels. Different priorities between breweries should be addressed.

Maybe there could be a scoring system. It should recognize breweries that have made a significant effort for things that are tangible. It can't be dumbed down that it is meaningless and doesn't meet the goal. It would have to be inclusive, but still needs to mean something, and still needs to be a differentiator.

Interviewee 4: There are so many ways to commit to sustainability. There could be different tiers (bronze, silver and gold). This would make it more accessible for all breweries to have a tiered approach.

18. What funding sources do you think should support CS certification?

Interviewee 1: If there's an audit, each firm would have to pay. Administrative and service fees could be charged to each brewer. Would be good to pursue OCB buy-in, and public grants.

Interviewee 2: GF2 (government), collaborations with other service providers, OCB

Interviewee 3: MOECC, and OMAFRA (government). Charging industry may be a double edged sword, depending on the demands to control the process. It would be good to collaborate with the OCB. Look for partnerships, and [government] policy changes so that it may be accessible.

Interviewee 4: OCB, and government grants.

19. What cost do you think would be fair to charge firms to apply for certification?

Interviewee 1: Not sure. In-line with work done.

Interviewee 2: NA

Interviewee 3: It would be difficult to charge for this. Having breweries pay would influence results. It would cater to large brewers with the ability to pay, and it would not cater to the majority [of firms]. Having external assurance through annual reporting is a good work-around, and would cost very little to start up.

Interviewee 4: NA

20. Do you have any other recommendations, advice, or comments?

Interviewee 1: May include information aggregate on best practices. May also include list of preferred suppliers. Need to show firms where to go and how to get there. Connect with other environmental service companies.

Interviewee 2: Looked at other certifications, they weren't considered useful. Certification would need to mean the same thing for all certified. Cost is a major barrier.

Interviewee 3: NA

Interviewee 4: Getting the OCB involved would be important. OCB collaboration with provincial government may help with grants. Could ask province for funding for research, and tax credits [for breweries].

Appendix 7: Interviews with Certification Administrators

The following interviews were held with four certification administrators within 2017. All responses follow each question.

1. Is your certification body private, public, not-for-profit, or for-profit?

Interviewee 1: Non-profit.

Interviewee 2: non-profit.

Interviewee 3: Not-for-profit, and charity.

Interviewee 4: Non-profit. We have a partnership with the industry association that we service. The board of directors is comprised solely of industry members.

2. How long have they been operating?

Interviewee 1: Over 20 years.

Interviewee 2: 3 years.

Interviewee 3: About 20 years.

Interviewee 4: Since 2010

3. Does the certification consider an enterprise-level approach? Or single product?

Interviewee 1: Not just a single product, also include supply chain considerations and EOL.

Interviewee 2: Considers the full enterprise including supply chain and EOL.

Interviewee 3: It covers products.

Interviewee 4: Not product, full enterprise. The next iteration of the program will have a product certification option. It will include a chain of custody tracking audit, tracking, certified suppliers, etc.

4. What elements are required for certification?

a. Is reporting required?

b. Are there prescriptive elements?

c. Is performance considered?

Interviewee 1: There is a set of rules called standards. There are required questions that must be completed, and there are other management related questions that need to make up 50% of the points necessary. There is an annual documentation audit, and a full on-site audit every 4 years. There is only one prescriptive element involving process behaviour. Performance is considered.

Interviewee 2: There are no prescriptive elements, other than a requirement to meet regulatory compliance. There are performance thresholds built on a tiered approach relative to the size of each firm.

Interviewee 3: Must certify the entire supply chain. There are 10 principles that must be followed, and there are regional variances across the globe. Regulatory compliance is required.

Interviewee 4: There is a self-assessment, a third party audit on an annual basis. The certification was built upon a self-assessment tool. Our primary goal is education, and certification is an add-on. There are 500 indicators identified, each firm has to self-identify on a scale of 1-4 how closely they align with each indicator. We provide a road map on how to improve. This accounts for flexibility, and diversity in the industry. We also have requirements for continuous improvement. We require annual improvement, and an annual audit. We do require performance metrics to be used. The first iteration of the program was based on ISO 14001.

5. Are there measures in place to consider the effectiveness of the certification?

Interviewee 1: Yes. Annual documentation audit, and on-site audit every four years.

Interviewee 2: Yes, there's an annual audit by third party auditors.

Interviewee 3: Yes, annual audit and five-year renewal.

Interviewee 4: Yes, annual audit

6. Does the scheme consider long-term aspects? (more than 5 years)

Interviewee 1: We update our program rules every year, and we are peer-reviewed every five years.

Interviewee 2: The firm would lose certification.

Interviewee 3: Five year renewal, and we have a 20 year plan.

Interviewee 4: Each firm would lose certification, so yes.

7. How is the organization funded?

Interviewee 1: We are self-sustaining being paid through industry. We've received government grants in the past.

Interviewee 2: We rely on industry for support.

Interviewee 3: Charity. The main funding is from certification holders. There is a small annual accreditation fee to each certified member. There are also partnerships and grants.

Interviewee 4: Through industry.

8. How is the cost of certification structured?

Interviewee 1: It's based on the size of the company being certified.

Interviewee 2: It's based on the size of the firm, and the amount of work required.

Interviewee 3: Depends on the size of the company and complexity. Auditors will charge based on time spent. Charges are also based on the number of employees, and annual revenue of the company being certified.

Interviewee 4: Based on the size of the company. There's an administration fee, and then the cost of the auditor. There is a desk audit every year, and an on-site audit once every three years. Larger companies have a full audit every year. The program was subsidized with government funding, but no longer.

9. How prominent is the ecolabel

/certification scheme? (provincial/state, national, international)

Interviewee 1: It's state-wide.

Interviewee 2: National.

Interviewee 3: International in over 80 countries.

Interviewee 4: State-wide

10. Does it consider scale (size of facility)? If so, how?

Interviewee 1: Some requirements are based on size. Best management practices do not consider size.

Interviewee 2: Yes, it's tiered based on the size of each firm.

Interviewee 3: Yes, already described.

Interviewee 4: Yes, different cost structure and requirements.

11. Do they provide their own assurance, or are other third parties required/have the option to provide assurance?

Interviewee 1: Third party audits are required. We train the auditors.

Interviewee 2: We perform our own audits.

Interviewee 3: All third party auditors. They charge approximately \$100/hour.

Interviewee 4: We have our own auditors.

12. Do firms have to be re-certified (i.e. regularly have assurance)? If so, what is the time-frame?

Interviewee 1: Yes, every year.

Interviewee 2: Yes, every year.

Interviewee 3: Yes, every 5 years to renew a certificate, and every year for maintenance.

Interviewee 4: Yes, every year.

13. Are there other unique, novel, or note-worthy elements to the certification scheme?

Interviewee 1: Yes.

Interviewee 2: NA

Interviewee 3: Very closely aligned with the United Nations Sustainable Development Goals.

Interviewee 4: NA

14. How long have you been involved with the organization?

Interviewee 1: Since 2009.

Interviewee 2: Three years.

Interviewee 3: 10 years.

Interviewee 4: 3 years.

15. Were you involved with creating the certification?

Interviewee 1: Yes.

Interviewee 2: Yes.

Interviewee 3: Yes. I was part of working groups with balanced stakeholder interests.

Interviewee 4: Yes, I was part of a team working toward developing the guidelines in conjunction with different stakeholders from industry.

16. Why did you choose the certification elements and requirements (identified in the public communications review) that you did?

Interviewee 1: We collaborated with industry and held multiple committee meetings. All rules sets have external peer review before being published. Rules sets are updated every year to stay current.

Interviewee 2: We wanted to balance the stringency of certification with its applicability to industry. We want to encourage as much performance improvement as possible, so we tried to make it flexible to encourage adoption.

Interviewee 3: Already answered.

Interviewee 4: Important to consumers. You have to listen to what the consumers and civil stakeholders are asking for, and set the rules around those requirements.

17. What obstacles did you face when developing the scheme? (Industry buy-in, funding, etc.)

Interviewee 1: It took a long time to get off the ground. It took four years. Self-assessment and pilot project both took a long time. Would not recommend a pilot.

Interviewee 2: You can't please everybody. Some groups will be upset that certain elements are not considered, whereas you have a difficult time to gain industry buy-in in the rules are so strict, they won't be able to be met.

Interviewee 3: Always a challenge with industry buy-in. We have a very large, prominent international supporter that is very much aligned with our brand. They facilitated meetings with industry, and got industry on board. They helped us significantly.

Interviewee 4: Industry must be involved, its important for buy-in. They're the ones that know about the processes and practices. You can't compare sustainability certifications from different industries. You need to focus on one industry, and use industry people to build it.

18. If you could change anything with the scheme, what would you change and why?

Interviewee 1: NA (change every year)

Interviewee 2: The scheme will go through review after five years.

Interviewee 3: NA (change every 5 years)

Interviewee 4: Would have started it sooner.

19. Can you give some advice for creating a certification scheme in the brewing industry?

Interviewee 1: Getting industry on board is crucial. Having a player [in industry] that is very vocal will be helpful. If a firm is large enough they may be willing to pay for an audit. Our audits cost about \$1000.

Interviewee 2: Be sure to balance the interests of industry, and environmental groups. Look for partnerships, and make sure to include industry when building the certification – it's crucial for buy-in.

Interviewee 3: How it is created is very important. Need to know what stakeholders you want involved (industry groups, indigenous groups, government, or other civil groups). The governance model is important; it can create credibility. Getting industry buy-in is difficult. How it is branded is very important. Need high volume of communication for consumers to understand messaging.

Interviewee 4: Industry buy in is crucial. Also start with an ecolabel as a goal. Think about what the program should include. Make sure it meets stakeholder expectations, while providing flexibility for differences in different firms.

20. Do you have any other comments or pieces of advice?

Interviewee 1: Having a committee is great. Having people that are invested, and getting buy-in from multiple firms to make a committee is very important to get it off the ground. It has to be industry-led.

Interviewee 2: NA

Interviewee 3: We offer group certification for SMEs and small producers, in which four or five companies may be audited and certified at the same time. This may be relevant. It helps because the certification requirements are reduced and streamlined. The small producers would not be able to be certified otherwise, and building small business is important.

Interviewee 4: NA

Appendix 8: Proposed Sustainability Certification Guidelines and Requirements

This document outlines the guidelines and requirements necessary to complete a sustainability report and achieve certification commending sustainability performance for the craft brewing industry in Ontario.

Overview

The following reporting guideline and requirements provide specifications that must be met to achieve certification. The interest and strategy for the reporting guideline and requirements is to promote sustainability performance and leadership within the craft brewing industry in Ontario. The focus of the report will be to provide a medium to communicate relevant sustainability performance data, and related goals and targets to all stakeholders. The reporting guideline and requirements have been developed with the goal of providing value to all participants, and creating standardized reporting practice within the craft brewing industry.

The guidelines and requirements must be followed, and an annual report must be publicly communicated to be eligible for certification. To achieve certification, all required disclosures must be included within the annual report, and requirements for optional indicators must be followed that correspond with each identified performance tier.

Warning Concerning Misleading Information

The information included within the report is required to be as accurate as possible to ensure appropriate benchmarking and comparison. If accuracy is limited without fault of

the reporting company, the limitations must be declared. Accuracy refers to the extent to which the reporter follows the guidelines and requirements, and whether or not information prepared and published by the reporter adequately addresses the information required within the reporting guidelines.

Precision takes into question the extent to which the information and data provided by the reporter appropriately represents the true figures of aspects in question. Precision is determined by varying characteristics dependent on the material aspect in question. The value provided by this certification will be directly affected by the reporting precision of all participants. It is strictly prohibited to report on misleading, and/or false information.

Objectivity, Consistency, and Transparency

The report must communicate the sustainability performance of the company objectively. Both strengths and weaknesses must be identified and described. Bias will be removed through avoiding omissions, or methods of presentation that may influence the reader to support a misleading belief. The report will be compiled in such a way that is consistent with the guidelines and requirements to ensure the ability of the reader to effectively compare reports. Reports will be developed in a transparent manner that enables third parties to analyse the data gathered, and processes used when creating the report.

Mandatory Disclosures

Please address the following mandatory disclosures within the report.

1) Reporting period.

- Disclose the start date and end date for the reporting period.

Notes: All data, and information disclosed within this report must fall within the reporting period. The reporting period will be one full calendar year. (E.g. January 1, 2016 to December 31, 2017).

2) Energy disclosures by source.

- Disclose the total electricity.
- Disclose the total natural gas.
- Disclose the total energy.
- Disclose the intensity ratio for total energy and production volume.

Notes: Total energy must be quantified in mega joules. An example disclosure of total energy intensity ratio is as follows: 13 MJ/HL of beer). Energy may be calculated by referring to utility bills, or in-house metering.

3) Water disclosures.

- Disclose the total water.
- Disclose the intensity ratio for total water and production volume.

Notes: Total water must be displayed in hectoliters, and the water use intensity ratio must also be displayed in hectoliters (e.g. 5HL/HL of beer). Data may be gathered from the utility provider, or through in-house metering.

4) Solid waste disclosures.

- Disclose the total solid waste.
- Disclose the intensity ratio for total solid waste and production volume.

Notes: Total waste must be calculated in Kg. Total waste includes the total weight of material sent to landfill. Diverted waste sources (such as through recycling, compost, or donating spent-grain), are not included in the final calculation. The total waste ratio should be displayed in relation to total beer produced (e.g. 0.1Kg/HL).

5) Climate disclosures.

- Disclose the total scope I CO₂-e emissions.
- Disclose the intensity ratio for total scope I CO₂-e emissions and production volume.

Notes: Scope I CO₂-e emissions refer to the quantity of CO₂ equivalent emissions resulting directly from processes controlled by the brewery. This includes combustion of fossil fuels during distribution, and all emissions resulting from processes within production. Intensity ratio example is as follows: 10kg CO₂-e/HL of beer. Scope I emissions may be calculated through identifying quantities from receipts, invoices, production records, stock records etc. To access a CO₂-e calculation tool, please contact the program administrators.

6) Wastewater disclosures.

- Disclose the total volume of wastewater.
- Disclose the intensity ratio for wastewater and production volume.

Notes: Total volume of wastewater is to be displayed in hectoliters. Intensity ratio example as follows: 2 HL of wastewater/HL of beer.

7) Materials and transportation disclosures.

- Disclose the percentage of suppliers within Ontario.
- Disclose all methods of transportation used for distribution.

8) Local community disclosures.

- Disclose the number of donations or sponsorships to local community groups.

9) Employment disclosures.

- Disclose the total number of employees.
- Disclose the total number of workplace injuries.
- Disclose the total number of employee support programs.

Notes: Employee support programs could include any type of wellness programs,

10) Governance disclosures

- Provide a statement of commitment to improve sustainability from the top-level decision maker.

Optional Indicators and Performance Assessment

Additional optional indicators have been identified (please refer to Appendix 1), and have been separated in two categories. There are two large categories titled “environmental impacts and indicators,” and “social impacts and indicators”. There are 16 total optional social indicators, and 35 total optional environmental indicators.

To improve flexibility and encourage adoption, three performance tiers have been created that correspond with the disclosure of optional indicators. Refer to the requirements for each performance tier below.

Bronze Tier

To achieve bronze tier performance, the brewery must:

- 1) Disclose information for a minimum of 20% (3 total) of the optional social indicators.
- 2) Disclose information for a minimum of 20% (7 total) of the optional environmental indicators.

Silver Tier

To achieve silver tier performance, the brewery must:

- 1) Disclose information for a minimum of 35% (6 total) of the optional social indicators.
- 2) Disclose information for a minimum of 35% (12 total) of the optional environmental indicators.

Gold Tier

To achieve gold tier performance, the brewery must:

- 1) Disclose information for a minimum of 50% (8 total) of the optional social indicators.
- 2) Disclose information for a minimum of 50% (18 total) of the optional environmental indicators.

Suggested Formatting

The following suggestions are not mandatory, but may help in the design and format of the report. The report should be digitally displayed on standard letter size (8.5" x 11"). There should be a title page identifying the report and the brewery. The mandatory disclosures should be displayed together on a single page. The mandatory disclosures may be accompanied by illustrations, or graphs to improve readability. Optional indicator disclosures should follow after the required disclosures. The final page should include closing remarks, and endorsement from the top-level decision maker from the brewery.

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