

**ROLE OF CO-OPERATIVES IN FACILITATING THE
IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT
GOALS: AN EXPERIENCE FROM NOVA SCOTIA, CANADA**

by

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“If we knew what it was we were doing, it would not be called research, would it?”
– Albert Einstein

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Abstract

Attainment of the Sustainable Development Goals (SDGs) will require concerted effort throughout societies everywhere. Although co-operatives, as community-embedded local organizations, have been promoted in advancing SDGs, to what extent co-operatives are furthering the SDGs is understudied. Here I analyze the extent to which 179 co-operatives in Nova Scotia, Canada are facilitating the SDGs in a two-step process. First, the SDGs were re-expressed for a Canadian, localized context. Second, the resulting framework was then used to analyze the contents of co-op mission statement. Patterns of mission statement alignment with the SDGs were further analyzed against co-op characteristics. Results indicate that the purposes of NS-based co-ops do align with many SDGs. However, the alignment is highly variable across different co-op sectors and environmental-related SDGs remain largely unsupported. Methodological and empirical practices are suggested to further holistically assess and enhance the impact of co-operatives on advancing SDGs, especially from an environmental perspective.

List of Abbreviations and Symbols Used

SDGs	Sustainable Development Goals
MDGs	Millennium Development Goals
Co-op	Co-operatives
UN	United Nations
UNGA	United Nations General Assembly
UNGC	United Nations Global Compact
UNTFSSSE	United Nations Inter-Agency Task Force on Social and Solidarity Economy
ILO	International Labor Organization
IRF2015	Independent Research Forum on a Post-2015 Sustainable Development Agenda
ICA	International Co-operative Alliance
WCED	World Commission on Environment and Development
WBCSD	World Business Council for Sustainable Development
FSDS	Federal Sustainable Development Strategies
GRI	Global Reporting Initiative
ISO	International Organization for Standardization
AA	AccountAbility
A4S	Prince's Accounting for Sustainability Project
SEA	Strategic environmental assessment
EIA	Environmental impact assessment

CSR	Corporate Social Responsibility
OSR	Organizational Social Responsibility
IIRC	International Integrated Reporting Framework
CDP	Carbon Disclosure Project
KPIs	Key Performance Indicators
OWG	Open Working Group on Sustainable Development Goals
NS	Nova Scotia
RSNS	Revised statutes of Nova Scotia
NSCC	Nova Scotia Co-operative Council
SSG	Support Services Group
CHFC	Co-operative Housing Federation of Canada
SPMS	Sustainability Performance Measurement Systems
n	Sampled population size
KWIC	Keyword in Context
ICT	Information and communications technology
χ^2	Chi-square test statistic
p	Probability of a chi-square statistic (indicator of statistical significance level)
WHO	World Health Organization

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Chapter 1 Introduction

1.1 Motivation

To overcome economic crises, inequalities, climate change and so many global challenges, in recent decades, both scholars and practitioners have sought ‘development’ that can balance economic, social and environmental needs. In this context, the need for sustainable development or more simply, sustainability has been identified as being of central importance for social organizations at all scales (Amin, 2013; Bergeron et al., 2015; Fonteneau, Neamtan, Wanyama, Morais, & de Poorter, 2010; Magee et al., 2013). Given the predominant role private organizations can play in contributing to sustainable economic growth, the social and environmental impacts of organizational engagement have been extensively recognized and enriched by various dialogues around business ethics, corporate social responsibility (CSR) or organizational social responsibility (OSR), corporate or organizational sustainability, sustainable entrepreneurship and so on (Zairi & Peters, 2002; Wheeler, Colbert, & Freeman, 2003; Ebner & Baumgartner, 2006; Garavan & McGuire, 2010). However, how to embed sustainability across organizations, and further measure and examine their outward impacts based on sustainability frameworks are addressed far less frequently despite its obvious importance (Banerjee, 2011; Haugh & Talwar, 2016; Maas, Schaltegger, & Crutzen, 2016). In this context, one form of social-development focused business organizations, co-operatives, have been identified by major international organizations to be “well-placed to contribute to sustainable development’s triple bottom line of economic, social and environmental objectives” (p. 4, International Co-operative Alliance (ICA) & International Labour Organization (ILO), 2014). Moreover, the ILO has argued that co-operatives can help facilitate the United Nations (UN)’ Sustainable Development Goals (SDGs). Specifically, the ILO asserts that co-operatives “can make

substantial, if not unique contributions to the achievement of the economic dimensions of the Sustainable Development Goals (SDGs)” (p. 14, ILO, 2014). As one of the oldest legally accessible alternative business organization models for responsible and social (community-embedded) enterprise, co-operatives are designed to meet the multiple needs of local communities and contribute to local sustainable development (ICA, 1995; Lejano & Davos, 1999; Wall, Duguay, & Rohan, 2004; Ridley-Duff & Bull, 2015). More importantly, the common principles and values shared by all the co-ops as principle-driven and value-based organizations, align closely with some of the SDGs¹. However, the extent to which outward impacts of co-operatives operating in the world align with the global SDG framework remains to be explored.

1.2 Research Objectives & Questions

Given the potential, but to date underexamined role that co-operatives can play in supporting the SDGs, the research objective is to identify the extent to which currently active co-operatives operating in Nova Scotia, Canada are facilitating the achievement of SDGs at a local level. Linked to this objective, are the four specific questions:

(1) How can the SDGs be re-defined for a local Canadian context? In this study, the intent is to identify a Canadian, localized and private organizational-oriented set of goals and targets derived from the SDGs.

(2) Are there any textual linkages among localized SDGs and their sub-targets? A systematic review and textual analysis are used to identify potential textual linkages and their relationship among the localized SDGs to ensure that the subsequent use a qualitative SDG

¹ See Appendix A for more insights regarding association between co-op principles and SDGs in a local context

framework appropriately reflected the nature and extent of substantively linked goals and targets.

(3) For a diverse sample of existing co-operatives active in Nova Scotia, to what extent do their mission statements align with the SDGs in a local context? The intent is to explore how the objectives of co-ops are textually in line with the localized SDGs and targets.

(4) Are there any differences in the extent to which localized SDGs are supported between different co-operative sectors? Statistical analysis is used to try to and reveal the potentially different SDG performances across various co-op sectors (by industry, age, profit status, and membership structure).

1.3 Organization of the Thesis

This thesis is composed of three chapters. Chapter 1 first provides a brief overview of the main methods used to answer the research questions. This is followed by a literature review. Chapter 2 is written as a stand-alone manuscript that describes the entire content of the research. This includes a detailed description of the mixed-methods used to undertake the analysis along with results of both the process of downscaling and interpreting the globally expressed SDGs into a framework that is locally relevant in a Canadian context. This framework is then used to analyse the purposes of Nova Scotia-based co-operatives. This is followed by a focused discussion of the overall role of Nova Scotia-based co-ops in advancing SDGs, integrated approaches to organizational sustainability assessment, and SDG planning in an organizational context. Chapter 3 provides a synthetic summary of the thesis, finalization of findings, discussion on the influence of this study and potential areas of further research, and recommendations for organizational sustainability assessment, particularly organizational SDG assessment in a local context.

1.4 Methodological Overview

1.4.1 Theoretical Background

In response to the research questions, the first agenda was to explore how the objectives of co-operatives were textually in line with SDGs from an ontological perspective, which is to understand the nature of realistic phenomenon (Tuli, 2011). The next was to identify why various co-ops had different alignments with SDGs from an epistemological perspective, which is to recognize the nature of diverse knowledge that influences the reality (Tuli, 2011). Given the distinct nature of the research objectives, mixed methods were applied in this study (Heron & Reason, 1997; Guba & Lincoln, 2000). This methodological paradigm combines both qualitative and quantitative approaches and integrates results so as to better address the complexity of the research inquiries (Greene, Caracelli, & Graham, 1989; Lingard, Albert, & Levinson, 2008). As the context of this study was designed to tackle sustainability issues within an organizational field, the application of mixed methods can provide a broader and deeper potential understanding of local sustainable development (Smith, 2015; Kanazawa, 2018), and concurrently, improve the accuracy and reliability of corporate sustainability performance by examining different data categories (Molina-Azorin, 2012; Rocco, Bliss, Gallagher, Pérez, & Prado, 2003; Van Maanen, 1979). As this research revolved around a substantial volume of textual data drawn from both the SDGs and co-op mission statements, the primary analytical techniques used was textual content analysis. This commonly used method allowed for the collected replicable and valid inferences regarding relationships within and between sets of text by interpreting and systematically coding those materials in a consistent manner. Once the qualitative coding was complete, the resulting data could then be re-expressed as quantitative data for further analyses (Weber, 1990; Riffe, Stephen, & Frederick, 2005; Vaismoradi, Turunen, & Bondas, 2013).

1.4.2 Analytical Approach

Content analysis. First used in health studies, content analysis is regarded as a systematic approach for identifying similar patterns from a qualitative dataset of sound, text or images, based on a pre-defined coding strategy (Berelson, 1952; Weber, 1990; Hsieh & Shannon, 2005). A prominent technique used throughout the social sciences, content analysis describes a series of analytic approaches ranging from impressionistic, intuitive, and interpretive analyses to systematic, strict textual analyses (Rosengren, 1981). More specifically, contextual content analysis was employed to firstly develop a localized SDGs framework and analyze the textual patterns (excluding the negative relationships) within the localized SDGs and their sub-targets. It was also used to identify what SDGs aligned with each mission statement of the participated co-operative, which will be both illustrated in Chapter 2.

Statistical analysis. Once the content analysis was complete, data regarding the frequency of alignment of co-operative purposes with the SDGs were compiled along with data related to key characteristics of the studied Nova Scotia co-ops. These data were then analysed statistically. To better understand the linkages within the SDGs and targets, as well as inter-relations among various co-op characteristics, Chi-square tests were used as a type of non-parametric statistic to examine relationships between categorical variables based on the distribution of frequency (Richard & Shavelson, 1988; McHugh, 2013; Treiman, 2014). In this study, Chi-square was used to identify the group differences of various co-op characteristics in SDG alignment frequency levels. The extent of the association (effect size) was measured by Cramer's V, which is one of the most common tests for measuring categorical variables with more than two categories (Grusky, 1966; Kotrlik & Williams, 2003). Specifically, Pearson chi-

square test² was applied throughout this study except when considering the cross-tabulated figures whose counts were less than five and Fisher's exact test¹ was applied (Field, 2013). By using Cramer's V in chi-square test, I could measure the extent of the association (effect size) among multiple relations. Chi-square tests can help to statistically generalize the different distribution of SDG alignments at each categorical sector. However, the results are usually complicated to interpret when analyzing three or more categorical variables (Field, 2013). As such, a post-hoc procedure test was applied by comparing proportions, using Bonferroni-adjusted p values. This post-hoc approach was previously suggested by MacDonald and Gardner (2000), and Sharpe (2015) to analyze each pair of proportions based on the significance value from Bonferroni adjustment.

1.5 Literature Review

The concept of "sustainability" is central to this study, it is useful to observe that the term "sustainability" is widely applied in many organizational settings and studies and is frequently used as the synonym to "sustainable development" (Blackburn, 2007; Mebratu, 1998). In my thesis, the word "sustainability" and the term "sustainable development" are used interchangeably for the most part, except when discussing the definitions of sustainability and sustainable development from a historical perspective.

1.5.1 From Sustainability to the Sustainable Development Goals (SDGs)

Arguably, sustainability, as a broad conceptual objective, was first introduced in forestry as a means of preserving nature for the future (Kuhlman & Farrington, 2010; Wiersum, 1995).

² Pearson's chi-square is usually used to examine the relationship between two categorical variables (Pearson, 1900; Field, 2013). However, in some cases where the samples are in small quantities, the Pearson's chi-square tends to produce significant values (Field, 2013). As such, one of the assumptions for using the Pearson's chi-square is that the expected frequencies in each cell of the contingency table should be greater than five (Field, 2013). Otherwise, Fisher's exact test is recommended to use when examining the relationship between categorical variables that in small samples or the expected frequencies in each cell is usually below five (Fisher, 1922; Field, 2013).

As a result of increasing concern regarding a range of local-to-global-scale resource depletion and environmental degradation challenges that arose through the 1960s, both awareness and the conceptual treatment/development of sustainability grew rapidly (Blackburn, 2007; Giovannoni & Fabietti, 2013; Kuhlman & Farrington, 2010; Meadows, Meadows, Randers, & Behrens III, 1972). Thus, environmental sustainability and more specifically, “the idea of environmental assessment and management” (p. 75, DuBose, Frost, Chamaeau, & Vanegas, 1995), emerged from the global agenda during the 1972 UN Conference on the Human Environment (DuBose et al., 1995; Mebratu, 1998). In this context, sustainability assessment was designed to meet the needs of measuring environmental impacts from a planning, project review and approval or policy developing perspective, such as environmental impact assessment (EIA) and strategic environmental assessment (SEA).

Subsequently, the concept of sustainable development was first officially proposed in the Brundtland Report illustrating results of the 1983 World Commission on Environment and Development (WCED), Sustainable Development was defined as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (p. 43, WCED, 1987). This concept was widely recognized around the globe and also extended the understanding of sustainability from environmental conservation to social and economic development, such as energy and climate, poverty reduction, food security and social equality (Dixon & Fallon, 1989; Hauff, 2007; Mebratu, 1998). Those issues and challenges that were primarily discussed in the Brundtland Report have, in many instances remained key global challenges in recent decades (Hauff, 2007).

Building on momentum following the release of the Brundtland Report (WCED, 1987) and with the approach of the end of the 20th century, the United Nations again led efforts to identify and achieve aspirational targets for ongoing progress towards sustainable development.

The resulting Millennium Development Goals (MDGs) identified tangible targets and plans for sustainable development towards the year 2015 for each of the triple pillars of sustainability (UNGA (United Nations General Assembly), 2001). Building on the successes as well as the lessons learned from the MDGs and their implementation globally, the United Nations launched the Sustainable Development Goals (SDGs) to help guide global sustainable development out to 2030 (UNGA, 2015).

1.5.2 Assessing sustainability in an organizational context

Responding to the growing global imperative, sustainability has been embedded into not only organizational strategy and management for the purpose of performance improvement (Etzion, 2007; Hannon & Callaghan, 2011; Aguinis & Glavas, 2012), but also accounting and reporting for communication or promotion purposes (Campbell, 2003; Gray, 2006; Gouldson & Sullivan, 2007; Baumgartner, 2014). Assessing sustainability has been an increasing focus of internal performance measurement, public accounting and reporting for private organizations at all scales. For example, sustainability assessment undertaken through an internally organizational process, referred to as sustainability performance, accounting or management control, can exert significant influence on a firm's internal decision-making process in a long-term context (Ferreira & Otley, 2009; Ness, Urbel-Piirsalu, Anderberg, & Olsson, 2007; Otley, 1999; Schaltegger, 2011) Concurrently, sustainability assessment can be undertaken based on standardized sustainability frameworks, referred to as public reporting or auditing, where internal data of organizations can be collected and used for communication or certification perspectives (Bragança, Mateus, & Koukkari, 2010; Magee et al., 2013; Schaltegger & Wagner, 2006). While firms and scholars of organizational sustainability assess 'sustainability' by using different concepts of sustainability accounting, performance measurement, and reporting, few studies are actually connecting the "dots" among those concepts for a better understanding of

organizational sustainability management (Blackburn, 2007; Malmi & Brown, 2008; Maas, Schaltegger, & Crutzen, 2016b). The integration of combining sustainability accounting, assessment and reporting towards a comparable and systematic process is needed more than ever, but is still in the stage of theoretical and methodological development (Battaglia, Passetti, Bianchi, & Frey, 2016; Gond, Grubnic, Herzig, & Moon, 2012; Vitale, Cupertino, Rinaldi, & Riccaboni, 2019). On the theoretical and methodological ground, a number of studies showcase similar approaches are referred to the process of sustainability assessment, although the purposes are different (Mokhtar, Jusoh, & Zulkifli, 2016; Montecchia, Giordano, & Grieco, 2016; Seele, 2016). Rather than separately review methods of assessing sustainability from different conceptual perspectives, this study focuses on integrating approaches and frameworks of organizational sustainability assessment from a methodological perspective.

Reflecting the diverse purposes and approaches, the theoretical basis for sustainability assessment within or of firms is a combination of traditional management performance, socio-economy development, political and ecological theories (Bebbington, Unerman, & O'Dwyer, 2014). Furthermore, the methods used when undertaking organizational sustainability assessments also vary with the intended purposes (Steurer, Langer, Konrad, & Martinuzzi, 2005) and can be as limited as being based on a literature review but can also extend to involving mixed approaches, such as interviews, surveys, document content analysis, and case studies (Bebbington et al., 2014). In parallel with the increasing prominence of organizational sustainability assessments are efforts to standardize their processes and communication of results. These include globally-used sustainability assessment frameworks, such as the Global Reporting Initiative (GRI) standards (GRI, 2018), International Organization for Standardization (ISO) standards/Guide 82 (ISO, 2014), World Business Council for Sustainable Development (WBCSD) guidelines (WBCSD, 2002), AA1000 Series of Standards (AccountAbility, 2018),

and the Prince's Accounting for Sustainability Project (A4S) (Fries, McCulloch, & Webster, 2010). Such frameworks are often used by large private organizations to guide their sustainability accounting and reporting and typically employ various guiding principles of sustainability and standardized indicators or example cases for other organizations against which sustainability performance can be assessed (Dias-Sardinha & Reijnders, 2001; Haugh & Talwar, 2016; Junior, Best, & Cotter, 2014). Given the increased accessibility and recognizability of such frameworks across the globe, organizations can voluntarily collect and report their sustainability performance through a standardized process. However, scholars of such initiatives and related application also argue that when a firm conducts an internal assessment based on these frameworks, those organizations have considerable discretion regarding what information becomes public, and what remains private. In so doing, this can increase the potential risk of "green washing" (Mahoney, Thorne, Cecil, & LaGore, 2013; Parguel, Benoît-Moreau, & Larceneux, 2011).

While these various sustainability frameworks or processes have been useful in the assessment of organizations at all scales (Adams, 2015; Ott, Schiemann, & Günther, 2017), other authors maintain that in many instances small-scale organizations lack the motivation, awareness and capacity to address sustainability of their operation and more importantly, still face the practical difficulties of using sustainability measuring tools (Chenhall, 2003; Malmi & Brown, 2008; Ferreira & Otley, 2009; de Villiers, Rouse, & Kerr, 2016). Ultimately, small-scale organizations that operate locally can also find it challenging to access suitably scaled public data to use in their analyses, and with limited resources it is often difficult, if not impossible, to hire sufficient professional support for conducting the assessment (Schaltegger, Burritt, Zvezdov, Hörisch, & Tingey-Holyoak, 2015). Given the various ways in which corporate sustainability can be assessed at various scales and the high level of dependence on largely self-

reported data, both the external validation of sustainability reporting and their comparability of resulting performance measures between organizations remain questionable (Parguel et al., 2011; Milne & Gray, 2013).

Despite the potential value of assessing organizational sustainability performance (e.g., GHG (Greenhouse Gas Emissions), identifying inefficiencies), very few studies have been identified in the literature that report empirical results. One example, however, de Villiers, Rouse, and Kerr (2016) examined sustainability performance and impacts of a New Zealand company by combining the Key Performance Indicators (KPIs), sustainability balanced scorecard, sustainability reporting measures, based on the data collected from interviews and document analysis of current organizational strategies and practices within the firm. Another example is provided by Vitale and colleagues (2019), who illustrate the process of integrating different approaches of sustainability accounting, control and reporting tools to assess an Egyptian company's practices in addressing sustainability issues.

Turning to the specific research on co-operative sustainability assessment and their role in local communities, case studies have been mainly applied in relevant literature (Mayo, 2011; Battaglia et al., 2016). Some researchers have undertaken a quantitative approach to understand the economic impacts of co-ops using input-output models (Folsom, 2003; Palme, Lundin, Tillman, & Molander, 2005; Karaphillis & Lake, 2015; Karaphillis, Duguid, & Lake, 2017). Others have, however, criticized these purely economic analyses as poorly representing the range of benefits, especially non-financial impacts associated with co-ops (Gordon, 2004; Deller, Hoyt, Heuth, & Sundaram-Stukel, 2009). While some studies have examined measures of diverse social impacts of large co-operatives at aggregate (e.g., Beaubien & Rixon, 2014), very few have set out to examine and measure multiple potential contributions of diverse co-ops in a local community (Hough & Novkovic, 2012; Leclerc, Brown, & Hicks, 2012).

Consequently, development of interdisciplinary holistic analytic approaches is needed to assess sustainability impacts of local organizations (Bebbington, Brown, & Frame, 2007; Wiek, Ness, Schweizer-Ries, Brand, & Farioli, 2012; Schaltegger, Burritt, Zvezdov, Hörisch, & Tingey-Holyoak, 2015), and especially co-operatives (Beaubien & Rixon, 2014).

1.5.3 Linking organizational performance to the Sustainable Development Goals

Endorsed as the current global compass for achieving sustainable development, the SDGs encourage organizations at all scales to contribute to the global agenda of sustainability by 2030, through a framework-setting of 17 goals and 169 targets that holistically address critical outstanding issues of human well-being, natural environment maintenance or improvement, social infrastructure and global partnerships (Davis, Matthews, Szabo, & Fogstad, 2015; UNGA, 2015). While both national and international collaborations are essential to achieving economic development, social inclusion and environmental sustainability under the umbrella of the SDGs (Campagnolo, Carraro, Eboli, & Farnia, 2016), the variety of challenges in utilizing this globally-optimal framework concern relevant stakeholders especially at a local scale (Horton, 2015; Stafford-Smith et al., 2017). To mitigate this challenge in an organizational context, the SDG Compass, developed by the United Nations Global Compact (UNGC), GRI, and WBCSD (2015), supplied a subset of rational steps for business organizations to align their strategies to practically achieve the SDGs. At the industrial level, the UNGC and KPMG (2015) jointly developed the SDG Industry Matrix that reports SDG-related case studies across different industrial sectors. Each study represents specific SDG goals and progress made towards them by various companies (UNGC & KPMG, 2015). Particularly within the co-operative sector, the ILO (2014) distinguish co-operatives from implementation and performance of economic-related SDGs and targets. Through representing diverse co-operative cases, the ICA and ILO (2014) have worked together to illustrate co-operative practice and

progress related to SDGs. These efforts have advanced the development of practical tools that promote the implementation of the SDGs amongst businesses, and in particular co-operatives. Within the national Canadian context, the Federal Sustainable Development Strategies (FSDS) was launched in 2016 as a national platform to advance SDGs, to identify local priorities for sustainable development, to leverage sustainability goals, and to specify actionable targets for multiple stakeholders (Government of Canada, 2016).

In parallel than efforts to promote SDG engagement are to assess progress towards the achievement of the SDGs. Given the objective-based nature of the SDGs, indicator-based tools have been developed to measure progress at global and national levels (Stafford-Smith, 2014; Campagnolo et al., 2016). Goal-oriented indicators, developed from the SDG Compass platform, provide publicly-accessible databases and assessment tools that businesses can use to measure and manage their SDG performance (GRI, UNGC & WBCSD, 2015). Similarly, the UN Inter-agency and Expert Group also keep updates on SDG-oriented indicators for various stakeholders at the international level, and from this, over a hundred indicators have been identified to measure the national SDG performance aligned with goals and targets (UNGA, 2017). Some studies focus on identifying different approaches of delivering and quantifying the indicators as a way to trace sustainability performance, by collecting data and categorising indicators based on triple bottom lines (TBL) and other sustainability frameworks (Hubbard, 2009; Westwood, 2014; Nikolaou, Tsalis, & Evangelinos, 2019).

At a national level, the assessment of progress towards the SDGs based on generalized indicators can be challenging (Osborn, Cutter, Ullah, & Farooq, 2015). For example, given that the SDGs are designed to address development challenges globally, how they are expressed at a local level, particularly given the very different local contexts that exist around the world, can be fraught. SDG goals and targets are identified to be both inter- and intra-connected based on the

inclusion and complexity of global sustainability (the Independent Research Forum on a Post-2015 Sustainable Development Agenda (IRF2015), 2014). There is also a desire to integrate local concerns and national strategies (for example as in the FSDS) with the global SDGs when considering organizational sustainable development (Santiago, 2014; Biggs & McArthur, 2018; Roseland & Spiliotopoulou, 2018).

Another concern is how to measure the localized SDG performance of local organizations, especially when there are clear gaps in how any one organization can address the breadth of sustainability concerns. These gaps inevitably vary between different businesses and environmental fields. On the one hand, when assessing organizational sustainability by sourcing internal data for external reporting or communication purposes without verification, the transparency and accountability of the assessment process can be influenced by the subjectivity of relevant stakeholders (Parguel et al., 2011). With limited resources and professional supports, it is frequently difficult for local organizations to connect their objectives with global SDGs, identify the role in achieving sustainable development and further measuring performance in a steerable and reasonable manner. Therefore, it is of vital importance to develop an integrated approach to adapt SDG framework to the local level, while developing an inclusive and transparent approach for measuring SDG performance of local organizations, including co-operatives.

Chapter 2 Analysis of Co-operative sustainability performance in a qualitative, localized SDG framework

This Chapter has been prepared as a manuscript for submission to the conference of “Implementing the Sustainable Development Goals: What Role for Social and Solidarity Economy?”, organized by the United Nations Inter-Agency Task Force on Social and Solidarity Economy (UNTFSSSE). In addition to the author of this thesis, co-authors include Michelle Adams, Louis Beaubien and Peter Tyedmers.

2.1 Introduction

In recent decades, the need to address sustainable development has provoked an unprecedented rethinking of the inter-connection of society, economy, and environment (B. Hopwood, Mellor, & O’Brien, 2005). Balancing sustainability issues, such as climate change, energy and resource management, social well-being, environmental protection and economic growth, challenges various stakeholders in their decision-making. Especially with the transformation of globalization, the sustainability trade-offs faced today are more consequential, systematic and complicated than ever before. To ensure a sustainable future, the Sustainable Development Goals (SDGs), previously proposed as an international commitment at a UN conference (UNGA, 2015), have been recognized as a global objective-based framework for sustainability with various priorities for governments, businesses and other organizations (Stafford-Smith, 2014).

Under the global agenda for sustainability, effective implementation of the Sustainable Development Goals (SDGs) will require concerted effort from all stakeholders and at all scales. The primary organizing principle of co-operatives around the world is to fulfil community needs, which can vary in scale and form (Beaubien & Rixon, 2014). Based on their common guiding principles and a traditional focus on addressing underserved issues within communities,

co-operatives are regarded by some as among the most important vehicles for implementing the SDGs and contributing to local sustainable development (ICA & ILO, 2014; ILO, 2014).

However, the extent to which established, locally-focused co-operatives enhance the achievement of SDGs remains unexamined. Here, we set out to analyse the extent to which co-operatives operating in Nova Scotia, Canada may contribute to fulfilling the SDGs through an analysis of organizational objectives as expressed in their mission statements.

It is estimated that more than 10% of humanity is involved with businesses that operate as co-operatives (ILO, 2014). As one of the oldest legally accessible alternatives for responsible and social (community-embedded) enterprise, co-operatives are designed to meet the multiple needs of local communities and as well as to contribute to local sustainable development (ICA, 1995; Lejano & Davos, 1999; Wall, Duguay, & Rohan, 2004; Ridley-Duff & Bull, 2015). In part, this is due to seven common principles (Table 1), to which all co-ops commit to upholding, making co-operatives a sustainable and participatory form of business (ICA & ILO, 2014). Despite the distinct nature of individual co-ops, those principles provide a clear indication of the solidarity, equality and inclusivity grounds that co-operatives operate under regardless of their setting, scale or purpose (Thériault, 2012; Leclerc, Brown & Hicks, 2012). Despite the centrality of the seven principles, relatively few studies have addressed the question of how local co-operatives advance co-op values and principles through their activities (Novkovic, 2008; Jones & Kalmi, 2012).

Table 1. Co-operative Seven Principles (from ICA, 1995)

Co-operative Seven Principles	Definition
1 Voluntary and Open Membership	Co-operatives are voluntary organizations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.
2 Democratic Member Control	Co-operatives are democratic organizations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary cooperatives members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner.
3 Member Economic Participation	Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing their cooperative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; and supporting other activities approved by the membership.
5 Education, Training and Information	Co-operatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their co-operatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of co-operation.
6 Cooperation among Co-operatives	Co-operatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures.
7 Concern for Community	Co-operatives work for the sustainable development of their communities through policies approved by their members.

Researchers have suggested that the seven principles can advance co-ops' economic performance through strategic planning and practice, further enhance social benefits, and address environmental concerns based on collective decision-making (e.g., (Carruthers, Crowel, & Novkovic, 2007; Sonja Novkovic, 2008). For example, based on the principle of member economic participation, many agricultural co-operatives provide access to basic economic resources and services to their members which supports the SDG of poverty reduction (Aal, 2008; Lemma, 2008). Similarly, Sustainable Development Goal 5 (*Gender equality*) and Goal 10 (*Reduced inequalities*) are supported through the principles of voluntary membership and democratic control, as co-operatives are open to all persons “without gender, social, racial, political, or religious discrimination” (ICA, 1995, para. 5)³. As co-operatives are principle-based, member-controlled and community-oriented organizations, the co-operative model, theoretically, is designed to engender and sustain multiple benefits for involved stakeholders and members, while enhancing social and environmental benefits for local communities (Alier, 2003; Hopwood et al., 2005; Novkovic, 2008). In a report that explored the potential role of co-operatives in achieving the SDGs, ILO and ICA (2014) claimed that “co-operatives are well-placed to contribute to sustainable development” (p. 4) and “their promotion and expansion could be an important instrument for achieving the Sustainable Development Goals” (p. 4). However, there are few empirical studies on how co-ops translate their principles and values into their management and business practices (Novkovic, 2008; Jones & Kalmi, 2012). At a much finer scale, it is also important to ask whether and how Canadian co-ops meet the objectives of sustainability in their communities?

³ See Appendix A for more insights regarding association between co-op principles and SDGs in a local context

In Canada, the co-operative model has existed since the 1840s. In 2016, more than 7,500 co-operatives across the country fulfill extensive needs for local communities, from supporting agriculture, manufacturing, and processing to facilitating access to housing, health care, and recreation, among others (Government of Canada, 2018). Co-operatives are embedded in multiple facets of the life of communities across Canada (MacPherson, 1975). For example, within the Maritime provinces of Nova Scotia, New Brunswick, and Prince Edward Island in particular, co-operatives have deep and important roots in society (MacPherson, 1975; Zeuli & Radel, 2005). However, to what extent co-operatives are aligned with local sustainable development is under-explored and how co-operatives enhance the achievement of SDGs remains to be appraised.

Given the promising role that co-ops can play in society, it was important to identify the extent to which currently active co-operatives operating in Nova Scotia, Canada are facilitating the achievement of SDGs at a local level. To achieve this, we first analysed the current SDG framework using contextual content analysis in order to build a refined and localized SDG framework. This framework could then be applied to measure the performance of local communities and organizations based in Canada with respect to fulfillment of the SDGs. Using the resulting localized SDG framework, we analyzed the extent of overlap between the SDGs and various mission statements of co-operatives in Nova Scotia through a textual content analysis. By presenting descriptive frequencies and crosstab statistics, we also assessed the distribution of SDG facilitation of the co-operatives at different levels. Furthermore, via statistical testing (chi-square), characteristics of Nova Scotian co-operatives (e.g., age, industry, profit status, and membership structure) are examined to analyze their impacts on SDG implementation.

2.2 Background

2.2.1 *The co-operative model in Nova Scotia*

The origin of the co-operative model in Canada dates back to a series of early social movements in the nineteenth century (MacSween, 1985). In Nova Scotia, the first consumer co-operative was incorporated in Stellarton in 1861 (Lotz, 1973). However, it was not until the early 20th Century and efforts to enhance social and economic development in rural parts of the province (through what became known as the Antigonish Movement) that co-ops in Nova Scotia became firmly established (MacSween, 1985). This helped expand the vision of what co-operatives could achieve throughout Atlantic Canada and other regions (Sacouman, 1977). Beyond the early co-op movements in support of traditional agricultural, fishery and retail industries, Nova Scotian co-operatives have extended their activities into financial services, education and human development (Lotz, 1973; Nova Scotia Co-operative Council (NSCC), 2014).

Supporting the early establishment of Nova Scotian co-ops have been legislative initiatives focused on sector-specific co-op development, such as the *Farmers' Co-operative Societies Act* (RSNS 1914, c. 4) and the *Fishermen's Co-operative Societies Act* (RSNS 1916, c. 5). These were followed by the more widely applicable *Co-operatives Associations Act* (RSNS 1935, c. 7) (NSCC, 2014). Under this legislation, the geographical scale of operations is an important basis upon which co-ops can be distinguished. Nova Scotian co-operatives are those that are registered provincially and as such can only operate within the province (Industry Canada, 2016). In contrast, federally-registered co-ops are able to operate throughout the country (Industry Canada 2016). Regardless of jurisdictional differences, both federally- and provincially-registered co-ops are defined in Canada as “a legally incorporated corporation that is owned by an association of persons to satisfy common needs” (Industry Canada, 2016, p.1).

The ownership, governance, and profit distribution are legally considered to be the essential basis of incorporation (Industry Canada, 2016). Depending on functions and activities, most federally- and provincially-registered co-ops can be owned and democratically controlled by consumers (e.g., retail or housing co-ops), producers (e.g., artisans or farmers), workers (employees), or multiple stakeholders (employees, clients and other groups) (NSCC, 2014; Industry Canada, 2016). However, financial co-ops (e.g., credit unions and co-op banking institutions) have been distinguished through legislation from other co-ops since the intensive debate regarding the financial co-operative system beginning in the 1950s (MacPherson, 2012; Industry Canada, 2016). Given the very different legal nature, financial co-ops are not included in this research.

Locally-based Nova Scotian co-operatives are highly diverse and are involved in providing child-care (e.g., Inverness Early Years Co-op), personalized health-care (e.g., Pictou County Home), other social services for vulnerable groups (e.g., SSG (Support Services Group)), advancing media technologies in public services (e.g., the Atlantic Film Co-op), providing recreation facilities (e.g., Deanery Project Co-operative), and recently advancing renewable community energy services (e.g., the Wind Energy Co-operative) (Thériault, 2012; Karaphillis & Lake, 2015). Housing co-ops, in particular, are well established throughout Nova Scotia (Co-operative Housing Federation of Canada (CHFC), 2010). Co-op activities are not only focused on community services in Nova Scotia, but also address environmental awareness in consumption and production. For example, Just Us! founded in 1995, is considered Canada's first Fair Trade coffee roaster (Chesworth, 2010). Overall, Nova Scotian co-operatives play a dynamic role in local community development but the extent to which they underpin local sustainable development is underexplored.

2.2.2 Measuring organizational sustainability performance

Sustainability performance is also referred to as sustainability assessment, measurement or accounting in an organizational context (Ness, Urbel-Piirsalu, Anderberg, & Olsson, 2007; Maas, Schaltegger & Crutzen, 2016a). Combining interdisciplinary fields of traditional management, socio-economy, political and ecological theories into practices, organizational sustainability assessments vary widely, based in part on their diverse contexts and purposes (Bebbington, Unerman & O'Dwyer, 2014).

Despite the diversity of ways in which organizational performance can be assessed, we can distinguish current studies of co-operatives and business organizations on the basis of whether they are internal facing or external facing. When assessments are internal facing, organizations seek changes or improvement by monitoring sustainability performance, beyond financial performance (Mass & Boons, 2010; Epstein & Buhovac, 2014). Specifically, in a co-operative context, a number of tools have been proposed to internally evaluate organizational performance. These include the Co-operative Sustainability Scorecard based on benchmarking metrics of Triple bottom lines (Christianson, 2008), the Sustainability and Planning Scorecard designed for local retail co-ops (Leclerc et al., 2012), and the Co-op Index typically used in worker co-ops for examining organizational values and principles towards sustainability (Hough & Novkovic, 2012).

In contrast, external facing assessments are typically motivated by or seek to inform relevant stakeholders regarding the organizational sustainability impacts (Clarkson et al., 2011) and as such external facing assessments are more likely based on acknowledged and comparable sustainability assessment frameworks (Schaltegger & Wagner, 2006). Frequently employed frameworks for external reporting of co-op sustainability performance have included the International Integrated Reporting Framework (IIRC), Carbon Disclosure Project (CDP),

AccountAbility (AA1000) and Global Reporting Initiative (GRI) (Mohammed & Inoue, 2013; Hashimi, Damanhoury & Rana, 2015; Anzilago et al., 2018).

Sustainability assessments, either for internal or external purposes, are, however, difficult to implement for most small, local organizations, such as provincially-based co-operatives that are the focus of this study. Amongst the various reasons discussed in the literature two broad themes can be identified: organizational limitations and the difficulty of down-scaling standardized frameworks. More specifically, many studies indicate that local organizations, often lack awareness and motivation (foreseeable benefits), knowledge and professional supports, or financial, human or other resources (Chenhall, 2003; Ferreira & Otley, 2006; Schaltegger & Wagner, 2006; Malmi & Brown, 2008; Zorpas, 2010). Concurrently, the adaptability of standardized frameworks to local conditions and issues also challenges many efforts to organizational sustainability assessment of small-scale, locally based organizations (Revell & Blackburn, 2007; Baumgartner, 2014; Maas et al., 2016b).

Beyond individual-based organizational sustainability assessment practices, methods have also been developed to assess the impact of related organizations as a collective sector using some form of external evaluation. For instance, the Sustainability Performance Measurement Systems (SPMS), combining indices of performance at not only the organizational level but also the sector level, have been applied by a number of authors as a basis upon which to exogenously assess corporate sustainability (Nardo et al., 2008; Milman & Short, 2008; Searcy, 2011).

In the co-op sector, integrating measurement of organizational sustainability performance is still being developed on a theoretical level, there have been few practical applications to assess the sustainability impact across organizations. While economic, social and potential environmental benefits of co-operatives for local communities and members have been

described through a number of case studies (Palme, Lundin, Tilman & Molander, 2005; Mayo, 2011; Battaglia, Passetti, Bianchi & Frey, 2016), few studies have assessed multiple and additive impacts of co-ops. Where this has been done, some studies have used input-output models to quantify economic impacts of co-ops (Zeuli et al. 2003; Karaphillis & Lake, 2014), while other studies indicate the deficiencies of quantifying economic impacts alone and have highlighted difficulties of measuring other non-financial impacts (Gordon, 2004; Deller, Hoyt & Sundaram-Stukel, 2009).

Especially at the local level, there is a lack of specific statistics regarding both co-operatives' multiple impacts and the comparison between co-ops and other private organizations. More importantly, given the widespread concerns about effective instruments and methodological challenges of capturing and measuring non-financial impacts of local co-operatives, some authors argue that there is not a "one-size-fits-all" (p. 860, Mass et al., 2016) approach, and development of interdisciplinary and collective analysis is needed more than ever to assess sustainability impacts of local organizations (Bebbington et al., 2007; Wiek, Ness, Schweizer-Ries, Brand & Farioli, 2012; Schaltegger, Burritt, Zvezdov, Hörisch & Tingey-Holyoak, 2015).

To fill this gap, Baumgartner (2014) proposed a holistic model to measure sustainability performance at the normative, strategic, and operational levels. In particular, the research used corporate mission statements as the basis upon which to assess organizational performance in line with sustainability objectives at normative and strategic levels (Baumgartner, 2014). Barkus, Glassman and McAfee (2000) also argued that mission statements can be regarded as one of the most important features for indicating corporate impact. From a managerial perspective, a number of studies have used mission statement analysis to examine corporate financial, social, and entrepreneurial performance (Pearce & David, 1987; Bart, Bontis &

Taggar, 2001; Kantabutra & Avery, 2002; Marzec, 2007). For example, Moneva, Rivera-Lirio and Muñoz-Torres (2007) collected mission statements of 52 Spanish companies and conducted a content analysis to examine the relationship between mission statement contents and companies' social and financial impacts, using the GRI sustainability framework.

Mission statement analysis continues to be “developed, disseminated and valued” (p. 98, Stallworth Williams 2008) in studies that seek to better understand the performance of various organizations (Ferreira & Otley, 2009; Dermol, 2012; Morioka & Carvalho, 2016). Given the objectives of our research, mission statement analysis has been used to assess the extent of collective corporate intention with broad sustainability objectives among local Nova Scotia-based co-operatives.

2.2.3 SDGs as a compass for sustainability

In parallel with using mission statement analysis as a tool to identify an outward sustainability impact of co-ops, the sustainability framework applied in this study is based upon the Sustainable Development Goals. As the current global compass for achieving sustainable development, the SDGs set 17 goals and 169 targets for governments, businesses and various stakeholders to use to guide their decision-making (UNGA, 2015). Together the 17 goals endeavour to holistically address critical outstanding issues related to human well-being, the natural environment, social infrastructure and global partnership (Davis, Matthews, Szabo & Fogstad, 2015). Given the complexity and inter-related nature of global sustainability challenges, however, the SDGs are identified to be highly inter- and intra-connected within and among goals and targets, (Open Working Group (OWG), 2014) which make it more challenging to apply them simply or separately. More importantly, prior research has also indicated that it can be difficult for stakeholders to advance, and implement this globally-developed framework at national, regional, and specifically local scales (Horton, 2015; Campagnolo, Carraro, Eboli &

Farnia, 2016; Stafford-Smith et al., 2017).

2.3 Methods

In order to identify the role of co-operatives in furthering the SDGs in a local Canadian context, we answered the four following questions:

(1) How can the SDGs be re-defined for a local Canadian context? In this study, specifically, we aim to identify a Canadian, localized and private organizational-oriented set of goals and targets derived from the SDGs.

(2) Are there any textual linkages among localized SDGs and their sub-targets? Through a systematic review and textual analysis, we aim to identify potential textual linkages and their relationship among the localized SDGs to ensure that the subsequent used a qualitative SDG framework appropriately reflects the nature and extent of substantively linked goals and targets.

(3) For a diverse sample of existing co-operatives active in Nova Scotia, to what extent do their mission statements align with the SDGs in a local context? By answering this question, we aim to explore how the expressed objectives of co-ops are in line with the localized SDGs and targets.

(4) Are there any differences in the extent to which localized SDGs are supported between different co-operative sectors? By conducting statistical analysis, we aim to understand and identify the potentially different SDG intentions across various co-op sectors (by industry, age, profit status, and membership structure).

2.3.1 Localizing the global SDGs into a qualitative analytical framework

Given that the SDGs have been developed to address sustainability challenges globally and our analysis was conducted in a very specific socio-economic setting, we had to first interpret the SDGs in a local Canadian context. This was done using contextual content analysis to understand and identify aspects of the SDGs that are applicable in a Canadian context through

a goal-oriented reading of the SDGs. This method aims to analyze the conceptual significance and background information within texts (McTavish & Pirro,1990). The contextual analysis proceeds from the starting premise that each goal and target of the SDGs represents a primary sustainability concern. To implement the process, we undertook a deductive searching inquiry using Nvivo (a qualitative data analysis software package, 2016, Version 11 for Mac, QSR International) and an Excel spreadsheet (Microsoft Corporation, 2016). Under each SDG, sub-targets exist that may specify such characteristics as a timeframe, potential stakeholder involvement, geographic setting or target audience regarding the stage of development. To illustrate this, targets 1.4 and 1.a of Goal 1 serve as examples⁴:

1.4 By 2030 (timeframe), *ensure that all men and women, in particular, the poor and the vulnerable (target audience), have equal rights to **economic resources**, as well as access to **basic services, ownership** and control over land and other forms of property, **inheritance, natural resources**, appropriate new **technology** and **financial services**, including microfinance* (UNGA, 2015).

1.a *Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries (target audience regarding the stage of development), to implement programs and policies (government-oriented) to end poverty in all its dimensions* (UNGA, 2015).

As we analyzed the context of each target under Goal 1 (*poverty reduction*), we identified those targets that fit into our analytical setting of a developed country (Canada), local

⁴ Different characteristics of SDG targets are illustrated in underlines and parentheses, while coding themes (introduced later in this section) are indicated in bolded text.

scale (Nova Scotia) and non-government orientation (co-operatives), and thus we selected target 1.4, rather than target 1.a, to retain as relevant for our localized SDG framework.

Within the downscaled SDGs, we used textual content analysis to analyze characteristics embedded in texts (Frey, Botan & Kreps, 1999). Again, target 1.4 (indicated above) provides an example with identified themes from the SDGs and targets appearing in **bold**. The content of each SDG target was reviewed, and key phrases, terms or short sentences were identified as key themes of each target and goal for content categorization and analysis. Themes identified in the scale-downed SDGs (e.g. *food system, economic resources, basic services, modern and resilient infrastructure, effective action and adaptation on climate change*) were reviewed in light of the Canadian federal government's Federal Sustainable Development Strategy (FSDS) and other government development policies introduced in response of the SDGs (Government of Canada, 2016), with the objective of understanding how the broadly described SDG themes might be applied or operationalized in Canada. For example, under the FSDS, the theme of modern and resilient infrastructure refers to green infrastructure, social infrastructure and other infrastructure investments as key categories (Government of Canada, 2016). Through this process more Canadian local-specific coding categories were developed to be applied in the content analysis of the studied co-operatives. In this case, the coding categories were used to compare and examine co-operative textual data to determine whether according to their mission statements, they were aligned with any SDGs and/or targets. More importantly, based on our analysis of textual themes deprived from initial coding categories, we then identified the inter-textual linkages among SDGs and targets. This included a detailed analysis of the nature and strength of the inter-linkages. For example, were they mutually supportive or was support unidirectional? Was the support enabling or fully supportive? We then finalized the localized and fully inter-linked SDG framework by integrating high-level SDGs (goals and targets), coding categories,

and associated goals & targets through Nvivo and spreadsheet analysis. Importantly, our analysis of inter-linkages excluded those that have previously been described as polar or opposing relationships (Cutter et al., 2015).

2.3.2 Content analysis of co-op mission statements and the localized SDG framework

All co-operatives⁵ incorporated under the Nova Scotia *Co-operative Associations Act* (RSNS 1989, c 98), and active as of September 1, 2016, according to the Registry of Joint Stock Companies (Government of Nova Scotia, 2016) formed the population (n=279) of co-operative businesses to potentially analyze. For all co-operatives in the population, a web-based search was conducted to identify all those with publicly accessible mission statements, and these were assembled into a Word document (Microsoft Corporation, 2016) while retaining source-specific identifying details in an Excel spreadsheet.

Except for those co-ops who have an explicit mission statement, all the public statement available on other co-ops' website was individually reviewed and structured based on Fred's (1996) practitioner theory, and the co-operative model proposed by Zeuli, Cropp, and Schaar (2004), where the key components of a co-op mission statement were considered when we collected the data: (1) What does the cooperative do? What are the services or products provided by the cooperative? (2) Who are the members (for consumer or worker co-ops) or customers (for producer co-ops) of the cooperative? (3) How will the co-operative operate? (4) Does the cooperative aim for economic objectives of survival, growth and profitability (profit or non-profit)? (5) Is the cooperative committed or responsive to community, social and environmental concerns? (6) What are the basic beliefs, values and principles of the cooperative? As corporate

⁵ In this study, local co-operatives refer to those co-ops that are registered provincially or territorially and as such can only operate within these jurisdictions (Industry Canada, 2016). Comparatively, financial co-ops (e.g., credit unions and co-op banking) are distinguished from the legislation of other co-ops since the intensive debate of financial co-operative system beginning in the 1950s (MacPherson, 2012; Industry Canada, 2016) and therefore are not studied in this paper.

mission statements can vary widely in length (Jauch & Glueck, 1988; Sufi & Lyons, 2003) and textual analysis challenges increase with volume, there was a need to condense the contents of some particularly lengthy mission statements. As a result, we set a limit of 500 words for those co-op mission statements greater than 500 words in length (n=3) to balance the needs of obtaining the substantive contents for data collection and the challenges of dealing with large volume of textual data. This was achieved by extracting textual data directly from a co-op's data source and structuring the extracted data based on the mission statement model defined by Fred (1996) and Zeuli and colleagues (2004).

When mission statements were available, additional details regarding the co-ops' operations were collected including: business sector or activity area of the co-op (e.g. housing, fishing), profit status (e.g., for-profit or not-for-profit), age relative to 2016, and membership structure of the co-op (e.g., consumer or producer⁶) for further statistical analysis.

The condensed coding categories (or codes) from the localized SDG framework, were then used to analyze the mission statement of each selected co-op for which mission statements were available within Nvivo using a deductive coding strategy. The deductive coding process allowed us to identify if the contexts of mission statements were textually linked with each code based on the sequential coding themes. We employed the Keyword in Context (KWIC) coding technique specifically in Nvivo (Leech & Onwuegbuzie, 2011) to identify if any keywords (including stemmed words) from the codes appeared in the textual description of a co-op statement. As some keywords were previously identified as textual inter-linkages among some SDGs and sub-targets through the SDG localization process, we multi-coded the same textual description to the linked codes based on keyword search, in these instances. For example,

⁶ Producer co-ops in this study refer to both producer and employee owned co-ops, following the classification of marketing co-ops used by the Co-operative Branch under Government of Nova Scotia.

through a search query of the keyword *education* (including its stemmed words) within the aggregated mission statement document, we identified 48 instances of its use amongst the co-operative statements assembled (Table 2). By reviewing every reference in the context in which it occurred, we coded three co-op statements in the sub-code from the code (and also the SDG target) *1.4 Inclusive access to basic services*. In addition, as the keyword *education* also linked target 1.4 with targets 11.1 and 4.3, we also coded the sentences in these corresponding codes. After the deductive coding process, and reviewing the then coded mission statements, we identified that some mission statement content had not been coded, although it aligned with one or more of the localized SDGs. This arose when the specific search keywords were missing from various mission statements. Consequently, we then applied an inductive coding strategy to all previously un-coded portions of co-operative mission statements and developed sub-codes and keywords under the initial coding categories that aligned substantively with one or more of the localized SDGs (Examples are elucidated further in section 2.4.1).

Table 2. Example of deductive coding

Coded Text from a co-op statement	KWIC	Corresponding coding categories
"Media artists at all levels of development receive funding, equipment, training and education, and professional presentation opportunities through AFSCOOP" (AFSCOOP, n.d., para.2).	<u>education</u> (including its stemmed words)	<i>1.4/11.1 Inclusive access to basic services</i> (UN, 2015): affordable and quality education; <i>4.3 affordable and quality vocational education</i> (UN, 2015)

After the coding process, we counted and merged the number of codes that aligned with each co-operative by SDGs and targets, and also calculated the number of distinctive SDGs their mission statements addressed. This provided a descriptive synthesis of SDGs nominally facilitated by the sampled co-ops. Using SPSS (2016, Version 24, IBM Corporation) in

statistical analysis, we assessed the overall SDG performance of the sampled co-ops through different co-op characteristic lenses (e.g. their industry sectors, age relative to 2016, profit status, membership structure). To comparatively analyze the association among SDG performance and various co-operative characteristics, we cross-tabulated different levels of SDG alignments by categorical sectors. Specifically, we categorized the levels of SDG alignments as: a) no alignments (which indicate categorized co-ops whose statements are not aligned with any of the 17 SDGs), b) few alignments (one or two alignments), and c) multiple alignments (three or more alignments). We conducted chi-square test⁷ (including post-hoc measures) to examine the association between various SDG alignment levels (no, few, and multiple) and each co-op characteristics (e.g. age, business sector, etc.). In addition, we examined the associations among the distribution of co-operative characteristics and applied descriptive analysis to understand the extent of SDG alignment with various co-op characteristics.

2.4 Results

We report results following the structure of research questions.

2.4.1 Localized SDG framework

Table 3 presents the condensed coding categories developed from the total 17 SDGs and 61 included targets that we have determined are applicable within the local Canadian context. The localized Canadian coding categories map across all 17 SDGs, and 61 targets, but only 7 sub-targets and 23 specific codes.

⁷ Chi-square test, as a non-parametric statistic, is often used to examine relationships between categorical variables based on the distribution of frequency (Richard. Shavelson, 1988; McHugh, 2013; Treiman, 2014). In this study, Chi-square was aimed to identify the group differences of various co-op characteristics in SDG alignment frequency levels. See Section 1.4.2, Chapter 1 for more details.

Table 3. Localized Canadian SDG framework (17 goals and 61 targets), all associated coding categories, and all identified inter-linkages between goals and targets

Note. Italic and regular text indicates a specific code pre-developed from the original text of the SDGs, FSDS, and other governmental policies; Bolded text represents words used in subsequent keyword coding search within co-operative mission statements (only bolded once, non-repetitive at each SDG target level); Solid underlined text represents word overlap and/or thematic relatedness that gives rise to an inter-linkage; Dashed underlined text highlight coding categories derived from the semi-inductive coding process of previously un-coded text from co-operative mission statements.

Coding categories (including SDGs, sub-targets and specific codes)			Interlinked goals & targets	
Goal 1: No poverty	1.4	<i>1.4.1 Inclusive access to basic services</i>	1 affordable and quality education ; 2 affordable food ; 3 affordable health-care services; 4 clean water and sanitation ; 5 affordable and accessible housing services; 6 natural resources and energy ; 7 public transit ;	2.1 (food); 3.8 (health-care); 4.3 & 4.5 (education); 6.1& 6.2 (clean water and sanitation); 7.1 (energy); 8.10 (financial services); 9.1 (affordable infrastructure); 11.1 (basic services); 11.2 (transportation); 2.3 (economic resources); 5.5 (women’s equal access) 10.2 (equal access)
		<i>1.4.2 Inclusive access to economic resources</i>	1 accessible technology ; 2 affordable financial services and investment ; 3 ownership and control over land & properties	
		1.4.3 Other accessible and affordable services and resources	<u>1 affordable publication</u> ; <u>2 accessible and affordable artworks and art-related facilities</u> ; <u>3 affordable funeral services</u>	
	1.5	<i>1.5 Resilience of the poor and the vulnerable to climate change, and other economic, social and environmental shocks</i>	2.4 (resilient food production); 9.1 (resilient infrastructure); 10.2 (inclusion of the poor and vulnerable); 13.3 (climate change);	

	Coding categories (including SDGs, sub-targets and specific codes)	Interlinked goals & targets
Goal 2: Zero hunger	2.1 Safe, nutritious and sufficient food that is accessible	1.4 & 11.1 (basic services); 10.2 (inclusive access);
	2.3 Resources provided for small-scale food producers	1.4 (economic resources); 14.b (small-scale fisheries); 9.3 (small-scale enterprises); 5.5 (women's equal access & opportunities); 10.2 (equal access);
	2.4 Sustainable food production and practices in agriculture, fisheries and aquaculture	1.5 (resilient food practices); 12 (responsible production); 13.3 (adaption to climate change)
	2.5 Genetic diversity of seeds, plants, and animals	15.8 & 15.a (biodiversity and domesticated animals)
Goal 3: Good health and well-being	3.4 Promote mental health and well-being	
	3.5 Prevention and treatment of drug and alcohol abuse	
	3.8 Safe, effective, quality and affordable health-care services	1.4 & 11.1 (basic services); 9.1 (resilient social infrastructure); 10 (inclusive access)
	3.9 Reduce deaths from chemicals, air, water, and soil	12.4 (chemicals and waste management)
Goal 4: Quality Education	4.2 Access to quality early childhood development, care and pre-primary education	9.1 (social infrastructure); 5.5 (women's equal access); 10.2 (inclusive access)
	4.3 Affordable and quality technical, vocational and tertiary education	1.4 & 11.1 (basic services); 5.5 (women's equal access); 10.2 (equal access)
	4.4 Technical and vocational skills for employment and entrepreneurship	8.5 (decent work)
	4.5 Education and vocational training for all	1.4 & 11.1 (basic services); 5.1 (against gender disparities); 10.2 (gender equality)
	4.7 Knowledge and skills for promoting sustainable development	12.8 (sustainable development and lifestyles); 13.3 (awareness on climate change); 5 (gender equality); 10.2 (human rights & equality)

Coding categories (including SDGs, sub-targets and specific codes)		Interlinked goals & targets	
	<i>4.a Inclusive and effective learning environment for all</i>	5.5 (<u>women's inclusive access</u>); 9.1 (<u>social infrastructure</u>); 10.2 (<u>inclusive access</u>)	
Goal 5: Gender Equality	<i>5.1 Against gender discrimination</i>	10 (<u>gender equality</u>)	
	<i>5.3 Technology to promote the empowerment of women</i>	9.c (<u>ICT</u>)	
	<i>5.5 Women's equal participation and opportunities for leadership at all decision-making in politic, economic and public life</i>	10.2 (<u>gender inclusion</u>)	
Goal 6: Clean water and sanitation	<i>6.1 Access to safe and affordable drinking water</i>	1.4 & 11.1 (<u>basic services</u>); 10.2 (<u>inclusive & equitable access</u>)	
	<i>6.2 access to adequate and equitable sanitation and hygiene</i>	1.4 & 11.1 (<u>basic services</u>); 5.5 (<u>women's equal access</u>); 10.2 (<u>inclusive access</u>)	
	<i>6.3 improve water quality</i>	3.9 (<u>mortality reduction from contaminated water</u>); 12.4 & 12.5 (<u>waste management and generation</u>)	
	<i>6.4 increase water-use efficiency</i>	12.2 (<u>efficient use of natural resources</u>); 9.4 (<u>resource-use efficiency and clean technologies</u>)	
	<i>6.5 integrated water resources management through cooperation</i>	9.1 (<u>green infrastructure</u>); 17.17(<u>partnerships</u>)	
	<i>6.6 protect water-related ecosystems (mountains, forests, wetlands, waters)</i>	15.2 (<u>deforestation</u>); 15.4 (<u>mountain ecosystem</u>)	
	<i>6.b Strengthen local communities in improving water and sanitation management</i>	16.7 & 17.17 (<u>participatory decision-making</u>);	
Goal 7: Affordable energy	<i>7.1 Affordable, reliable and modern energy services</i>	1.4 & 11.1 (<u>basic services</u>); 10.2 (<u>inclusive access</u>)	
	7.a	<i>7.a.1 Promote renewable energy and energy efficiency</i>	9.1 (<u>green infrastructure</u>); 9.4 (<u>resource-use efficiency and clean technologies</u>); 9.5 (<u>clean technology</u>); 12.2 (<u>efficient use of natural resources</u>)
		<i>7.a.2 Research and investment in clean energy technology and energy infrastructure</i>	
Goal 8: Decent work and economic growth	<i>8.5 Full employment and decent work for all</i>	4.4 (<u>employment and entrepreneurship</u>); 5.5 (<u>women's</u>)	

Coding categories (including SDGs, sub-targets and specific codes)		Interlinked goals & targets	
		<u>economic opportunities</u>); 10.2 (<u>inclusive access</u>)	
	8.10 Strengthen the capacity of domestic financial institutions to provide banking, insurance and financial services for all	1.4 (<u>financial services</u>); 9.3 (<u>financial services for SMEs</u>); 10.2 (<u>inclusive access</u>)	
Goal 9: Industry, innovation and infrastructure	9.1 Sustainable, resilient and affordable infrastructure	1 green infrastructure (modern water and wastewater facilities; clean energy); 2 social infrastructures (health-care ; early learning and child-care ; housing ; cultural and recreational infrastructure); 3 public transportation ; 4 other affordable infrastructure (including investments)	1.4 & 11.1 (<u>affordable infrastructure</u>); 1.5 & 13.3 (<u>climate change</u>); 3.8 (health-care); 4.2 (<u>early learning</u>); 4.a (<u>education environment</u>); 6.5 (water management); 7.a (energy); 10.2 (equal access); 11.2 (<u>public transit</u>); 11.7 (<u>green spaces</u>); 12.4 (<u>waste management</u>)
	9.3 Promote small-scale industrial and other enterprises into markets	2.3 (<u>food producers</u>); 14.b (fishers)	
	9.4 Upgrade and retrofit industries with resource-use efficiency and clean technologies	7.a (energy efficiency and clean technologies); 6.4 (<u>water-use efficiency</u>); 12.2 (<u>efficient use of natural resources</u>)	
	9.5 Enhance scientific research and technological capabilities	7.a (<u>clean energy research and technologies</u>)	
	9.c Increase access to ICT	5.3 (<u>ICT</u>)	
Goal 10: Reduce inequalities	10.2 Social, economic and political inclusion of all irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	5 (<u>gender equality</u>); 5.5 (gender inclusion);	

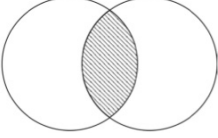
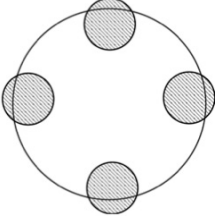
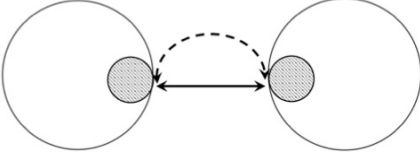
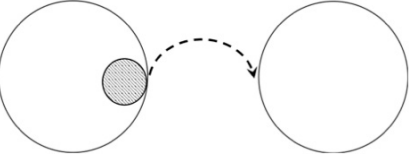
Coding categories (including SDGs, sub-targets and specific codes)		Interlinked goals & targets	
Goal 11: Sustainable cities and communities	11.1 Adequate, safe and affordable housing and basic services	1 Affordable and quality education ; 2 Affordable energy services; 3 Affordable food ; 4 Affordable health-care services; 5 Affordable public transit ; 6 <u>Other affordable basic services (funeral services)</u>	1.4 (<u>basic services</u>); 9.1(<u>affordable housing and other infrastructure</u>); 2.1 (food); 3.8 (health-care); 4.3 & 4.5 (education); 6.1 & 6.2 (<u>clean water and sanitation</u>); 7.1 (energy); 10.2 (<u>inclusive access</u>);
	11.2 Safe, affordable, accessible and sustainable transport system (especially for the vulnerable)		1.4 (<u>basic services</u>); 9.1(<u>social infrastructure</u>); 5.5 (<u>women's equal access</u>); 10.2 (<u>inclusive access</u>)
	11.4 Protect cultural and natural heritage		
	11.6 Reduce the environmental impact of cities through pollution and waste management		12.4 (waste management)
	11.7 Safe, inclusive and accessible green spaces		5.5 (<u>women's equal access</u>); 10.2 (<u>inclusive access</u>); 9.1 (<u>green infrastructure</u>)
	11.a Support regional development planning		
Goal 12: Responsible consumption and production	12.2 Sustainable management and efficient use of natural resources		6.4 (water-use efficiency); 7.a (energy efficiency); 9.4 (resource-use efficiency); 14 (marine resources); 15 (biodiversity and ecosystem); 15.2 (forests)
	12.4 Chemicals and all wastes management to minimize adverse impacts on human health and the environment		3.9 (<u>mortality reduction</u>); 6.3 (<u>water quality</u>); 9.1 (<u>green infrastructure</u>); 11.6 (waste management); 14.1(<u>reduce marine pollution</u>)
	12.5 Reduce waste generation (through prevention, reduction, recycling and reuse)		6.3 (<u>water recycling and reuse</u>); 14.1(<u>reduce marine pollution</u>)
	12.6 Report sustainable practices and sustainability information		16.6 (<u>effective and accountable institutions</u>)

Coding categories (including SDGs, sub-targets and specific codes)		Interlinked goals & targets
	12.8 <i>Awareness of sustainable development and lifestyles</i>	4.7 (<u>education for sustainable development</u>); 13.3 (<u>awareness on climate change</u>)
	12.b <i>Tools to monitor sustainable development impacts for sustainable tourism</i>	
Goal 13: Climate action	13.3 13.31 <i>Improve education, awareness-raising on climate change</i>	1.5 (<u>resilience for the vulnerable</u>); 2.4 (<u>resilient food production</u>); 9.1 (<u>resilient infrastructure</u>); 4.7 & 12.8 (<u>education for sustainable development</u>);
	13.32 <i>Improve human and institutional capacity on climate change</i>	
Goal 14: Life below water	14.1 <i>Reduce marine pollution</i>	12.4 & 12.5 (<u>waste management and generation</u>)
	14.2 <i>Sustainably manage and protect marine and coastal ecosystem</i>	
	14.3 <i>Minimize and address the impacts of ocean acidification including through scientific cooperation</i>	13 (<u>climate change</u>); 17.17 (<u>partnerships</u>)
	14.b <i>Promote small-scale artisanal fishers</i>	2.3 (<u>small-scale food producers</u>); 9.3 (<u>small-scale enterprises</u>);
Goal 15: Life on land	15.2 <i>Sustainable management of forests</i>	6.6 (<u>protect water-related ecosystems</u>); 12.2 (<u>sustainable use of natural resources</u>)
	15.4 <i>Conservation of mountain ecosystems</i>	6.6 (<u>protect water-related ecosystems</u>)
	15.8 <i>Prevent and reduce of invasive alien species and control the priority species</i>	2.5 (<u>genetic maintenance of domesticated animals</u>)
	15.a <i>Mobilize financial resources to sustain biodiversity and ecosystems</i>	2.5 (<u>genetic biodiversity</u>)
	15.b <i>Finance sustainable forest management</i>	
Goal 16: Institutions	16.6 <i>Effective, accountable and transparent institutions</i>	
	16.7 <i>Responsive, inclusive, participatory decision-making</i>	5.5 (<u>women's equal participation</u>); 10.2 (<u>inclusive participation</u>); 17.17 (<u>partnerships</u>)

Coding categories (including SDGs, sub-targets and specific codes)		Interlinked goals & targets
Goal 17: Partnerships	<i>17.17 Promote public, public-private and civil society partnerships</i>	16.7 (<u>public partnerships in institutions</u>)

Through the analysis of word overlap and thematic relatedness, we identified 106 instances of inter-linkages among the localized SDGs and targets (shown in the right-most column of Table 3). Note, the negative influences between SDGs were not covered in this analysis of textual linkages; inter-linkages between targets that belong to the same SDG were not considered further in the analysis. Most inter-linkages occur between and at the level of targets, with some exceptions (See Table 3). For example, Goal 5 (*gender*) links with Goal 10 (*inequalities*); Goal 12 (*sustainable consumption and production*) links with target 2.4 (*sustainable food practices*); and Goal 13 (*climate change*) links with target 14.3 (*ocean acidification*) (Table 3). Importantly, the level of inter-linkage between SDGs is substantial. More than 90% of the targets (55/61) that remained after the process of localizing them for a Canadian context, directly or indirectly connect with other goals and targets. The only exceptions were targets 3.4 (*mental health*), 3.5 (*drug & alcohol abuse*), 11.4 (*heritage*), 11.a (*sustainable tourism*), 14.2 (*marine ecosystems*), 15.b (*finance forest management*) and 16.6 (*accountable institutions*). In contrast to these unlinked targets, target 1.4 (*basic services & economic resources*) was the most inter-linked target, whose achievement enhances the implementation of 14 other targets. On the other hand, target 10.2 (*equality & inclusion*) appears to be the most supported target, whose implementation is indirectly or directly advanced by 21 other targets.

Table 4. Visualisation of four types of linkages between SDGs and their targets along with the specification of those linkages that arise in the localized Canadian context

Type of linkages	Linked goals and targets
Mutually Supporting (5)	1.4 & 11.1; 1.4 & 9.1; 11.1 & 9.1; 4.4 & 8.5; 4.7 & 12.8
	
Relying and supporting (34)	1.4 & 2.1; 1.4 & 2.3; 1.4 & 3.8; 1.4 & 4.3; 1.4 & 4.4; 1.4 & 4.5; 1.4 & 6.1; 1.4 & 6.2; 1.4 & 7.1; 1.4 & 11.2; 1.4 & 8.10; 12 & 2.4 ; 9.3 & 2.3; 2.3 & 14.b; 9.1 & 3.8; 9.3 & 14.b; 9.1 & 4.2; 9.1 & 4.a; 12.2 & 6.4; 6.6 & 15.2; 6.6 & 15.4; 9.1 & 7.a; 7.a & 9.4; 9.1 & 11.2; 9.1 & 11.7; 12.2 & 15.2; 5, 5.1 & 10 ; 5.5 & 10.2; 11.1 & 2.1; 11.1 & 3.8; 11.1 & 4.3; 11.1 & 4.5; 11.1 & 6.1; 11.1 & 6.2; 11.1 & 7.1;
	
Bidirectional enabling (27)	Directly (6) 1.5 & 13.3; 6.3 & 12.4; 5.3 & 9.c; 11.6 & 12.4;
	Indirectly (21) 1.5 & 9.1; 1.5 & 2.4; 2.4 & 13.3; 2.5 & 15.8; 2.5 & 15.a; 6.3 & 12.5; 4.7 & 13.3; 12.2 & 9.4; 6.4 & 9.4; 9.1 & 6.5; 7.a & 12.2; 7.a & 9.5; 9.1 & 12.4; 9.1 & 13.3; 12.2 & 14 ; 12.2 & 15 ; 12.4 & 14.1; 12.5 & 14.1; 12.8 & 13.3; 13 & 14.3 ; 16.7 & 17.17
Unidirectional enabling (40)	Indirectly (40) 6.3 → 3.9; 12.4 → 3.9; 6.5 → 17.17; 6.b → 16.7; 6.b → 17.17; 12.6 → 16.6; 14.3 → 17.17; 1.4 → 10.2 ; 1.5 → 10.2; 2.1 → 10.2; 2.3 → 10.2; 3.8 → 10.2; 4.2 → 10.2; 4.3 → 10.2; 4.5 → 10.2; 4.7 → 10.2; 4.a → 10.2; 6.1 → 10.2; 6.2 → 10.2; 7.1 → 10.2; 8.5 → 10.2; 8.10 → 9.3; 8.10 → 10.2; 9.1 → 10.2; 11.1 → 10.2; 11.2 → 10.2; 11.7 → 10.2; 16.7 → 5.5; 16.7 → 10.2; 1.4 → 5.5; 2.3 → 5.5; 4.2 → 5.5; 4.3 → 5.5; 4.5 → 5.1; 4.7 → 5 ; 4.a → 5.5; 6.2 → 5.5; 8.5 → 5.5; 11.2 → 5.5; 11.7 → 5.5;
	

Note. **Mutually supporting (A & B)** indicates targets A and B can be both fulfilled by achieving one or the other; **Relying and supporting (A & B)** indicates target A relies on the achievement of target B, and target B specifies the content of target A therefore supports the overall achievement of target A; **Bidirectional enabling (A & B)** indicates approaches to achieving targets A & B directly or indirectly contribute to the achievement of one another; **Unidirectional enabling (A→B)** indicate achievement of target A can facilitate the general achievement of target B, but not vice versa. **Bolded text** indicates the linkages between SDGs and sub-target.

To further illustrate the nature of the linkages between goals and targets, four forms of relationships were identified among the inter-linkages of the localized SDGs reported in Table 3: (1) mutually supporting, (2) relying and supporting, (3) bidirectional enabling, and (4) single indirectly enabling (Table 4). Specifically, five pairs of targets mutually support one another, which indicates progress towards either target is increased by achieving the other one. For instance, target 1.4 and target 11.1 are mutually supportive through the achievement of the same objective – to provide basic services for all (Table 4).

Under the deductive coding process, we applied different coding strategies according to different relationships between the SDGs and targets. For mutually supporting and relying and supporting relationship types of SDGs and targets, we co-coded the co-op statements based on their interconnected themes and keyword search. For example, targets 1.4 and 11.1 are mutually supportive of each other and intersect on the theme basic services. At the same time both targets 1.4 and 11.1 are supported by the achievement of target 2.1 (Table 4), which is to provide affordable and quality food. Based on the above linkages, when we conducted the keyword search and coded corresponding co-op mission statements under target 2.1, we also co-coded any identical co-op statements under targets 1.4 and 11.1, but with special attention on affordable food access and services. For directly and indirectly enabling interlinked SDGs and targets (Table 4), when the co-op statement was coded under one goal and/or target, we checked if the coded text in the co-operative mission statement had additional textual entailments for achieving another linked goal and/or target. Together with the inductive coding process (driven directly by relevant but previously uncoded text within co-op mission statements), SDG textual alignments with each co-op statement were coded under the specific coding categories (see Table 3) and summarized at the SDG level.

2.4.2 Alignment of the mission statements with SDGs

In total, the mission statements of 179 active NS-based co-operatives were collected from a variety of online sources including corporate websites and government reports. This sample represents approximately 65% of the total non-financial sector co-operatives that were active as of September 1, 2016 in Nova Scotia. The aggregate mission statements from the 179 co-operatives amounted to more than 23,000 words that were then assessed against the localized SDGs. The average mission statement is around 125 words.



Figure 1a. United Nations' Sustainable Development Goals (UNGA, 2015)

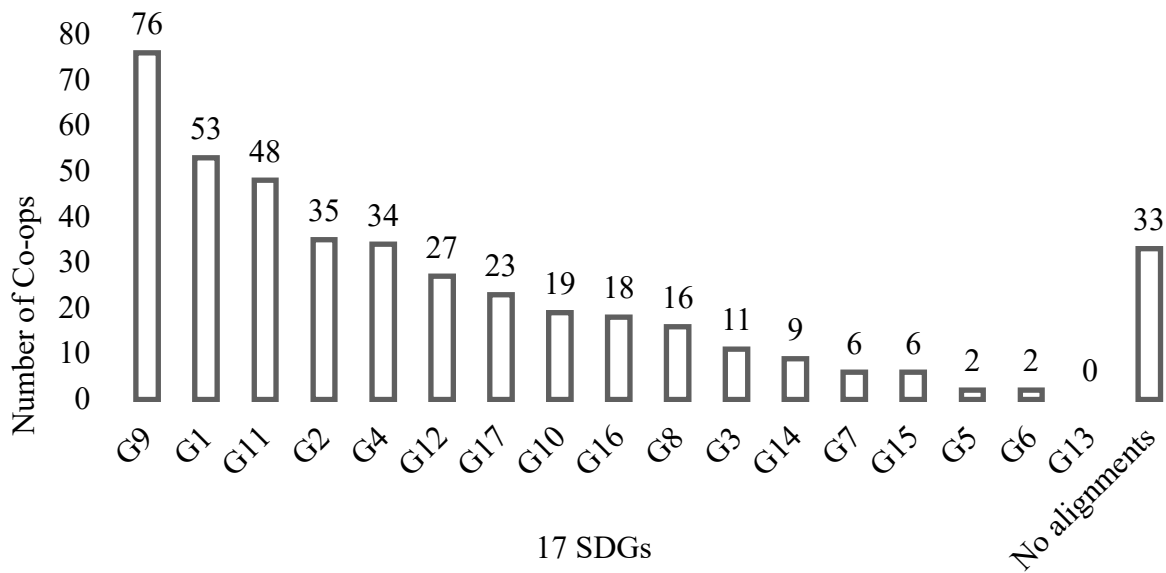


Figure 1b. Frequency with which the purposes of 179 Nova Scotian co-operatives align with the Sustainable Development Goals

Figure 1b shows the frequency with which text within the mission statements of NS-based co-operatives aligned with each of the localized SDGs. Importantly, co-operatives, which were coded under various targets within the same goal, were counted only once within that SDG to ensure there was no double counting, but a co-op can be multiply coded under different goals. As shown from Figures 1a and 1b, Goal 9 (*industry & infrastructure*) appears to be the most facilitated goal amongst the studied co-operatives, as more than 40% (n=76) of the 179 co-op mission statements examined align with this goal. Similarly, NS-based co-ops had relatively frequent alignments with Goal 1 (*poverty reduction*), Goal 11 (*cities & communities*), Goal 2 (*food*), and goal 4 (*education*) (n ranging from 34 to 53). In contrast, the purposes of very few co-ops (under 10) aligned with Goal 5 (*gender equality*), Goal 6 (*water & sanitation*), Goal 7 (*energy*), Goal 14 (*marine environment*) and Goal 15 (*land environment*). None of the 179 studied NS-based co-operatives had purposes that aligned with Goal 13 (*climate change*). Importantly, using this analytical framework, nearly 20% of the purposes of the sampled co-ops (n=33) did not align with *any* of the SDGs.

2.4.3 Associations between co-op characteristics and SDG alignment

Table 5 summarizes the major characteristics of the 179 co-operatives assessed in this study along with the characteristics of all 279 co-operatives that were active in NS and described in the provincial registry database as of September 1st, 2016.

Service industry co-operatives were the most common in both the sample set and total co-op population, representing 26 % and 24%, respectively. Housing co-ops appear less frequently (14%) within the sample set than in the entire population (almost 23%). In contrast, agriculture co-operatives were marginally over-represented amongst the assessed co-ops (18% of the total assessed), relative to their occurrence in the total co-op population (Table 5). Co-operatives in other industries distribute similarly in both datasets.

In the cases of profit status and membership structure, both non-profit and consumer-member co-ops appear more frequently than for-profit and producer-member co-operatives in both the study and overall datasets respectively (Table 5). In both datasets, co-ops that are older than 10 years are much more common than younger co-operatives (Table 5).

Table 5. Characteristics of assessed co-ops and all registered co-ops in Nova Scotia as of September 1, 2016

Industry	N (%) of Co-ops			Other characteristics	N (%) of Co-ops			
	Included	Excluded	Total		Included	Excluded	Total	
Agriculture	32 (18%)	3 (3%)	35 (12.5%)	Profit Status	For-Profit	74 (41%)	48 (48%)	122 (44%)
Craft	13 (7%)	5 (5%)	18 (6.5%)		Non-profit	105 (59%)	52 (52%)	157 (56%)
Fish	6 (3%)	5 (5%)	11 (3.9%)	Membership Structure	Consumer	98 (55%)	74 (74%)	172 (62%)
Forest	6 (3%)	3 (3%)	9 (3.2%)		Producer	81 (45%)	26 (26%)	107 (38%)
Housing	25 (14%)	39 (39%)	64 (22.9%)	Age	≤10 yrs.	80 (45%)	19 (19%)	99 (35%)
Investment	11 (6%)	7 (7%)	18 (6.5%)		>10 yrs.	99 (55%)	81 (81%)	180 (65%)
Retail	15 (8%)	6 (6%)	21 (7.5%)					
Service	46 (26%)	22 (22%)	68 (24.4%)					
Worker	24 (13%)	10 (10%)	34 (12.2%)					
Miscellaneous	1 (1%)	0	1 (0.4%)					

Results of the cross-tabulation of co-ops’ characteristics and the extent of their alignment with SDGs appear in Table 6. From the chi-square results, there are statistically significant associations between co-op profit status & membership structure and degrees of SDG alignment ($\chi^2(6) = 20.82, p < 0.01$), and between industry sector and degrees of SDG alignment (Fisher’s Exact value = 47.79, $p < 0.001$) (Table 6). In contrast, the association between age and SDG alignment is not statistically significant ($\chi^2(2) = 0.885, p > 0.05$) (Table 6). Based on results of effect size, we can conclude that there are moderate associations between profit status & membership structure and SDG alignments (effect size = 0.27), and between industry sector and

SDG alignments (effect size =0.35). Both effect sizes are statistically significant at the 0.01 level.

Table 6. Crosstabulation of co-op characteristics and SDG alignments, and results of chi-square tests

Characteristic		Degree of SDG alignment						Chi-square test			
		No alignments (n=33)		Few alignments (n=74)		Multiple alignments (n=72)		Total		Test Value	Effect size
		n ¹	% ¹	n ¹	% ¹	n ¹	% ¹	n ¹	% ¹		
Profit Status & Membership Structure	Non-profit & Consumer	6	9.2	21	32.3	38	58.5	65	100	20.82**	0.24**
	For-profit & Consumer	12	36.4	13	39.4	8	24.2	33	100		
	Non-profit & Producer	8	20	21	52.5	11	27.5	40	100		
	For-profit & Producer	7	17.1	19	46.3	15	36.6	41	100		
Age	Age ≤10 yrs.	13	16.3	32	40.0	35	43.8	80	100	0.885	0.07
	Age >10 yrs.	20	20.2	42	42.4	37	37.4	99	100	<i>(p > 0.05)</i>	
Industry	Agriculture	4	12.5	18	56.3	10	31.3	32	100	47.79***	0.37***
	Craft	5	38.5	5	38.5	3	23.1	13	100		
	Fishery	0	0.0	1	16.7	5	83.3	6	100		
	Forestry	1	16.7	0	0.0	5	83.3	6	100		
	Housing	3	12.0	3	12	19	76	25	100		
	Investment	4	36.4	4	36.4	3	27.3	11	100		
	Retail	5	33.3	8	53.3	2	13.3	13	100		
	Service	6	13	18	39.1	22	47.8	46	100		
	Worker	5	20.8	16	66.7	3	12.5	24	100		
	Miscellaneous	0	0.0	1	100	0	0.0	1	100		

Note. ¹Number and percentage of co-operatives in each categorical sector achieving different levels of alignment. No alignments indicate categorized co-ops whose statements are not aligned with any of the 17 SDGs, few alignments indicate the co-ops who align with one or two SDGs, and multiple alignments indicate the co-ops who align with three or more goals. ** p < 0.01, *** p < 0.001. The underlined test value was provided by Fisher's Exact test, and others were provided by Pearson Chi-square test.

In order to identify the association between characteristic type and categorical level of SDG alignment, we conducted a post-hoc test by comparing the proportions of co-ops in each sector by each level of SDG alignment. The bolded figures in Table 6 are statistically significant at the adjusted 0.05 level, indicating values that differ discernibly from other values. Looking within the profit status and membership structure characteristics, non-profit and consumer-member co-ops most frequently align with multiple SDGs (58.5%), and only six co-ops with these characteristics (representing only 9.2%) did not align with any SDGs. In contrast, both for-profit and consumer-member, and non-profit and producer-member co-operatives aligned less frequently with multiple SDGs at 24.2% and 27.5% respectively. Moreover, the proportion of for-profit and consumer-member co-ops with no alignments accounted for 36.4% of all of these co-ops – the highest rank of non-alignment among other co-op characteristic sectors. Turning to the industry sector characteristic, similarly, a larger proportion of both agricultural and worker co-operatives (at 56.3% and 66.7% respectively) have relatively few alignments (Table 6). However, more than 70% of fishery-, forestry- and housing-focused co-operatives align with multiple SDGs. In contrast, the proportions of retail and worker co-operatives both have low rates of multiple SDG alignments, at 13.3% and 12.5% respectively. For all other sectors there is not a significant relationship found.

To further understand the level of alignment associated with the distribution of co-op characteristics, we analyzed the association between each pair of characteristic categories using chi-square tests, the results are significant at 0.05 level. From Figure 2, we can identify the association of co-operative industry with other characteristics, and there is an association between membership structure and profit status. The possible effect of self-association is

apparent among various co-op characteristic sectors with the exception of the relationship between age and profit status.

Note. All results are significant at 0.05 level.

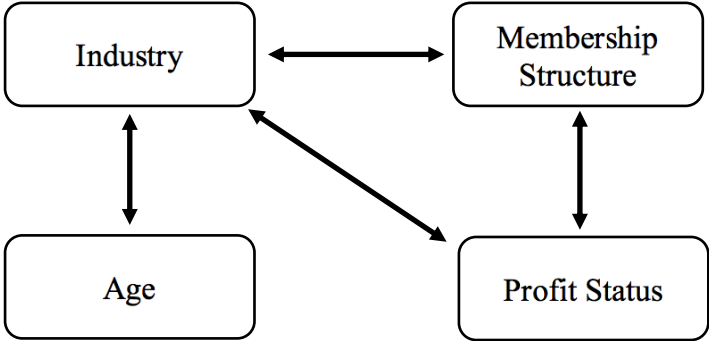


Figure 2. Associations among co-operative characteristics

To better understand the significant associations that exist between some co-op characteristics and those co-ops' alignment with the SDGs, we graphically illustrated the distribution of SDG alignments in each industry sector (omitting one co-op whose industry sector was miscellaneous), by membership structure, profit status and age (Figure 3). The resulting visual representation helps illustrate the statistical results described above.

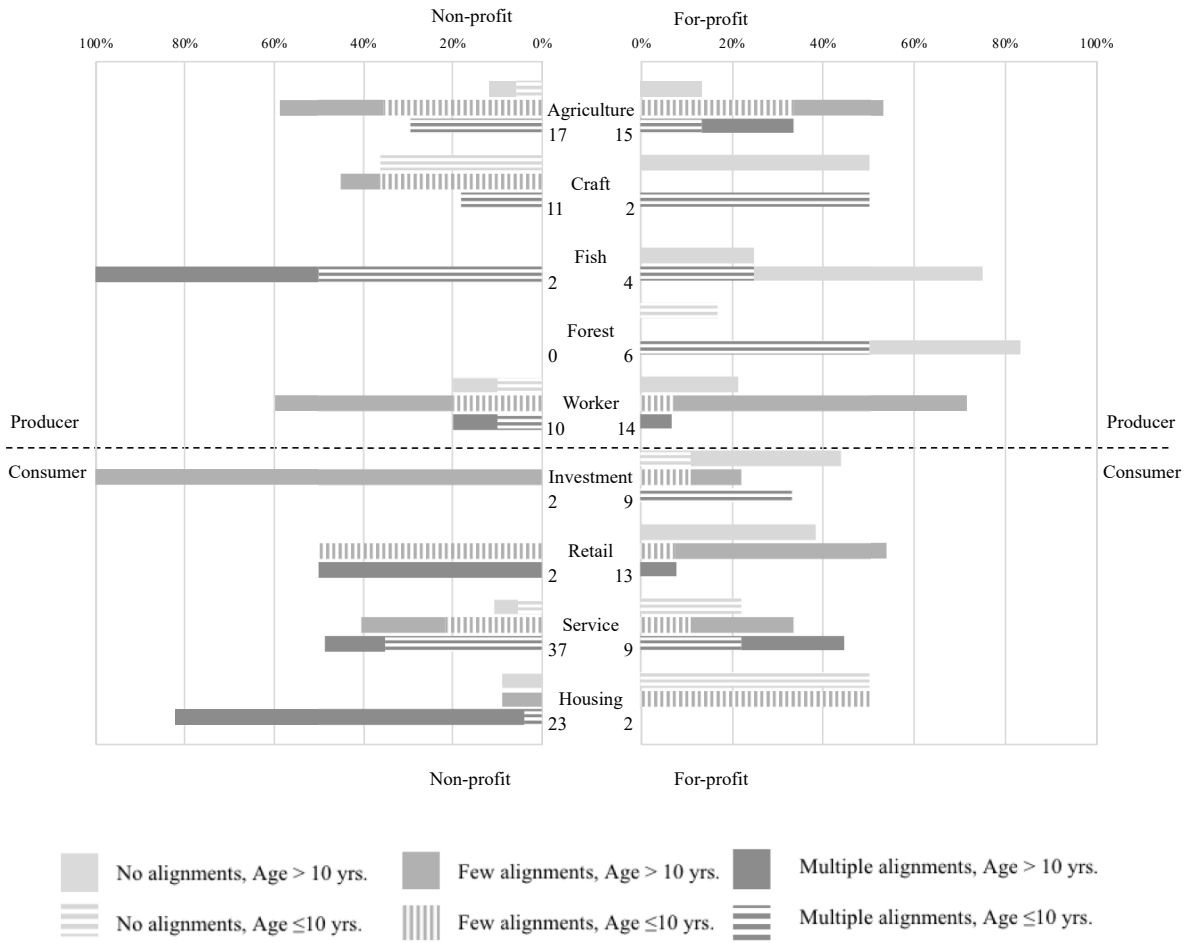


Figure 3. Frequency and strength of alignments of the purposes of Nova Scotia-based co-ops with the SDGs in terms of the co-ops' characteristics in terms of i) membership structure, ii) profit-orientation, iii) sector and iv) age.

In Figure 3 (and supported statistically in Table 6), it is evident that non-profit and consumer-member co-ops tend to have more overall alignments with the SDGs and more frequent alignments with multiple SDGs than any other co-op sector. More specifically, service and housing sector co-ops, and, in particular, housing sector co-ops that were established for more than ten years prior to 2016, display stronger alignment with the SDGs (Figure 3). In contrast, for-profit and consumer-member co-ops had purposes that aligned far less frequently with the SDGs (Figure 3, Table 6). Specifically, the proportion of for-profit and consumer co-

ops with no alignments with any SDGs is greater than that of any other co-op sector. Amongst all for-profit and consumer member co-ops, retail co-operatives are the most common sub-type, accounting for almost 40% (13 out of 33). Interestingly, about 40% of all for-profit retail co-ops (age > 10 yrs.), had no alignments with any SDGs. Less than 10% of all for-profit retail co-ops, regardless of age, aligned with multiple SDGs (Figure 3, Table 6). Among producer-member co-ops, most non-profit co-ops aligned with very few SDGs (Figure 3). These were typically described as agricultural, craft or worker co-ops. While both non-profit and for-profit agriculture and worker co-ops are most likely to have few alignments with SDGs, their sister producer-member co-ops, in the fishery and forestry sectors tend to have multiple alignments with SDGs (Figure 3). This tendency is statistically significant (Table 6), although fishery and forestry sector co-ops only account for about 3% of all the co-ops studied and in existence in NS in 2016 (Table 5).

2.5 Discussion

2.5.1 Contribution and limitation of NS Co-operatives in advancing SDGs

Our results illustrate that at a local level in Nova Scotia, most studied co-operatives (80% of the total sample) have purposes that align with at least one SDG (Figure 1b). In terms of substantive alignment with the SDGs, most of the co-ops studied tend to facilitate social and economic objectives (Figures 1a and 1b). This supports earlier assertions by the ILO (2014) and the ILO and ICA (2014) that indicate that co-operatives “could be an important instrument for achieving the SDGs” (p.4, ILO & ICA, 2014) and more specifically, that co-ops can make substantial contributions to the “economic, social and societal” (p.14, ILO, 2014) dimensions of the SDGs.

In Nova Scotia, the alignment with socio-economic SDGs occurs primarily in relation to the provision of affordable and quality basic services and infrastructures, especially housing

(associated with Goals 1, 9, and 11), food (Goals 1, 2, and 11), health care (Goals 1, 3, 9, and 11), public transportation (Goals 1, 9, and 11), early childhood education and professional training (Goals 1, 4, 9 and 11); Similarly, alignment also occurs in relation to improving access to resources (especially for small-scale and artisanal businesses (Goals 2, 9, and 14⁸), the awareness of sustainable development (Goal 4), and promoting sustainable production and consumption (Goal 12).

Beyond the specific purposes of co-ops in Nova Scotia, the seven guiding principles that unite all co-operatives globally are suggested to play a potentially important role in supporting the SDGs. Previous studies have suggested the applicability of the seven principles in advancing co-ops' economic and social performance, as well as addressing local environmental concerns (Novkovic et al., 2007; Novkovic, 2008). Given that principles of “voluntary and open membership”, “democratic member control” and “cooperation among co-operatives” (p.1, ICA, 1995) broadly align with Goals 5 (*gender equality*), 10 (*equality*), 16 (*institutions*) and 17 (*partnerships*)⁹, it is somewhat surprising then that these four SDGs were not more frequently supported by the specific purposes of the co-ops whose mission statements were analysed (Figures 1a and 1b). This is partially explainable, however, by recalling that most of the studied Nova Scotian co-operatives did not include the common principles and values in their mission statements. If, however, all co-ops had explicitly included the common principles in their mission statements, the frequency of alignment with SDGs 5, 10, 16 and 17 would have been much higher than indicated by our analysis, and the number of co-ops whose mission statements had zero alignments with the SDGs (n=33) would have dropped to zero. For example, only two

⁸ Particularly artisanal fishing communities in Nova Scotia.

⁹ See Appendix A for more insights regarding association between co-op principles and SDGs in a local context.

co-ops specifically address the issue of gender equality (Goal 5) in their mission statements though social equality is widely discussed and addressed by many Canadian co-operatives (Lipp & McMurry, 2015) and Principle 1 (voluntary and open membership) is widely understood to encompass gender equality (Table 2). This issue, however, raises a broader potential limitation of our decision to rely on the explicit contents of mission statements as the basis upon which to understand the purposes of co-operatives. Certainly, there are other ways of understanding both the intended actions of co-ops, as well as their actual impacts in communities. Such further research could be undertaken using a broader suite of corporate data at the operational level (e.g. corporate strategies, annual report, and other discourses) or through analyses of actual change that co-ops have effected.

It is important to note, however, that the depth of alignment with these social objectives is highly variable (Figures 1a and 1b) although some socio-economic SDGs (such as Goal 5) are not, relatively, explicitly represented currently by co-ops in Nova Scotia. The particular alignment of Nova Scotian co-ops is perhaps not too surprising given the history of the co-operative movement in NS. Through the early 20th Century the Nova Scotian co-operative movement grew substantially through the efforts of the Antigonish Movement (MacPherson, 1975). Many of these co-operatives strived to stretch their identities and purposes to support education and training opportunities for their members (e.g. the Nova Scotia Co-operative Union), improve and stabilize production for farmers and fishermen (e.g. Farmer's and Fishermen's Co-operative Societies (MacSween, 1985), and further empower the public with economic development and social benefits (e.g. through housing co-ops and business-oriented co-ops) (NSCC, 2014). In addition to the development of traditional co-operative stores and producer-member co-ops, co-operatives in Nova Scotia have emerged to support different

leisure activities (e.g. theatre and music co-ops), transportation, health-care and a variety of services to not only for their members, but also the public as a whole (NSCC, 2014).

More specifically, housing co-operatives in our study, mostly non-profit, tend to align with multiple SDGs by providing socially-affordable housing for the public and especially people in vulnerable situations (Table 6 and Figure 3). Since 2001, the federal government has invested in the Affordable Housing Initiative (AHI) to increase availability of affordable housing units across Canada (Government of Canada 2013). This has enabled housing co-operatives to become a major presence in the co-operative sector in Canada (Pomeroy & Falvo, 2013; Leviten-Reid & Lake, 2016). A number of authors have previously suggested that non-profit housing is not only more affordable but increases tenant self-governance engagement in housing than is the case in for-profit housing (Goldblatt, 2004; Achtenberg, 2006; Wiener, 2006). It is not surprising then, that 92% of housing co-ops in our study were not-for-profit co-ops but the purposes of these co-ops aligned much more strongly with the SDGs than did their for-profit counterparts (Figure 3).

More than 80% of the fishery and forestry co-ops in Nova Scotia, although only representing a small proportion of the total co-ops analyzed, addressed multiple SDGs in their mission statements (Figure 3). This level of alignment is not too surprising given that a number of scholars have previously identified co-operatives active in fisheries and forestry sectors as broadly supporting food sustainability, resource management, and conservation concerns through community-based structures (Hanna, 2000; Baskaran & Anderson, 2005; Hull & Ashton, 2008). Looking at the most common specific SDG alignments of Nova Scotian fisheries and forestry-related co-ops, it appears that many promote small-scale business (Goal 9), sustainably exploit resources (Goal 12), and facilitate participatory management (Goals 16 and 17). Separately, fishery co-ops also frequently promote sustainable food production (Goal 2) and

artisanal fishery (Goal 14), while forestry co-ops typically identify sustainable forest management (Goal 15) and forest ecosystem conservation (Goal 6) in their mission statements.

Aside from the relatively few fishery and forestry co-ops in our study whose purposes included sustainably using natural resources (aligning with Goals 14 and 15), very few co-ops analyzed addressed issues explicitly related to environmental sustainability, such as climate change (Goal 13) and water stewardship (Goal 6) (Figures 1a and 1b). It has been suggested by Fleming and Jones (2012) that such a gap in local-scale concern for global-scale environmental issues in organizational purposes should not be surprising. In this context, it could be argued that the lack of explicit concern amongst local organizations to address pressing global-scale challenges is a recognition that they need to be tackled at larger scales of organization. The ILO (2014) also indicates that “co-operatives and the wide SSE (Social and Solidarity Economy) can make substantial, if not unique contributions to the achievement of the economic dimensions of the SDGs” (p. 13) and further that “co-operatives should focus their energy on these goals and targets for which they are best suited” (p. 14). However, the counter argument is that if not addressed locally by someone, somewhere, then these issues will never be addressed by anyone. Although the socioeconomic development role of local co-operatives is widely acknowledged (Bateman, 2007; Levi & Davis, 2008; Norhatan, 2018; Tarhan, 2018), the potential significance and responsibility of local organizations including co-ops in addressing larger-scale environmental issues is broadly overlooked and should be explored more.

Another seeming gap in terms of alignment with the SDGs amongst the NS-based co-ops occurs amongst the for-profit, retail co-ops. More than 90% of these co-ops aligned with no or few SDGs (Figure 3). Where alignments did occur amongst these co-ops most were with Goal 1 (*poverty reduction*) and Goal 2 (*food*).

A final issue that arises from the analysis that is based on the classification of Nova Scotian co-ops is that the classification system used by the provincial government is somewhat inconsistent with the way co-ops are organized more generally. For example, in Nova Scotia worker co-ops are included in producer-member co-ops when in other jurisdictions they are described separately, and agriculture co-ops are considered amongst producer co-ops when elsewhere they can be aligned with consumer co-ops.

2.5.2 Organizational Sustainability

Our approach also illustrates a process through which the globally framed SDGs can be re-cast to inform an integrated sustainability assessment for organizations at any scale. Previous authors have argued that the collective messages from the SDGs are not explicit or detailed enough to operationalize at the scale of individual countries, regions or organizations (Stafford-Smith, 2014; Gupta & Vegelin, 2016), and it is in this context that SDG indicators were proposed to quantitatively specify and assess implementation progress towards the SDGs and their targets (World Health Organization (WHO), 2016). However, the application for these SDG indicators remains at national levels (Flückiger & Seth, 2016). Whether and how an indicator-based SDG approach could be implemented at a local context is still underexplored.

As Cutter and colleagues (2015) previously identified, a challenge that arises when attempting to interpret and apply the SDGs are the numerous overlaps and linkages amongst the SDGs and their targets. Based on our localized Canadian country setting interpretation of the global SDG framework, multiple types of linkages were identified among SDGs and targets (see Tables 3 and 4). The nature and extent of these linkages may or may not be similar in other country-specific settings. In a general way, the methodological and analytical process of interpreting and downscaling SDGs from global to local levels is important and necessary

although those re-interpreted frameworks can be various depending on different contexts and needs.

Further research can focus on sustainability assessment as well, as it is increasingly important in any organizational context. There are a number of techniques or processes that are available to co-operatives to undertake sustainability self-assessment or can be applied by external organizations to assess their sustainability performance (Brown et. al, 2015).

A number of challenges, however, arise when attempting to apply standardized sustainability assessment techniques or frameworks to small-scale, locally-based organizations (Ness et al., 2007; Baumgartner, 2014). Most obvious is the limited internal capacity and specialized knowledge typically available in many small organizations, coupled with insufficient financial resource to hire technical and professional supports to undertake sustainability performance assessment and reporting (McEwen, 2013; Schaltegger et al., 2015a). This is exacerbated when available tools, particularly towards SDG assessment, are designed primarily for large organizations (Batista & Francisco, 2018; Rosati & Faria, 2018). Given these challenges it is perhaps not surprising then that there are few studies on how to either assess alignment with sustainability objectives or the actual performance of small-scale, locally-based co-operatives and other organizations in an integrated manner (Malesios et al., 2018). In this research we have illustrated a framework that can, we believe, be applied more widely by first down-scaling and localizing the global SDGs into a specific country context, and then applying organizational discourse and content analysis to evaluate the stated purposes of local co-ops against the localized SDGs. This approach can of course also be applied to other forms and scales of organization to provide insights regarding their alignment with the SDGs in particular or more generally with other global-scale sustainability frameworks.

2.5.3 Advancing SDGs in an organizational context

As a global agenda for achieving sustainability, the SDGs should be well-recognized by organizations at all scales. The implementation of the SDGs requires both logistical and practical efforts from various stakeholders. It is important to ask how to address SDGs in local-scale organizations and how organizations respond to the SDGs. Concurrently, various types of interaction have been discovered by recent studies at SDG and target levels. However, approaches for various stakeholders to identify the SDG overlaps in their context of decision-making remain to be explored (Nilsson, Griggs & Visbeck, 2016; Coopman, Osborne & Ullah, 2016). Another challenge is how to articulate organizational SDG strategies and further measure their SDG impact and performance in a local context. Although different approaches such as the SDG Compass and the SDG Indicators, have been used by large organizations (Flückiger & Seth, 2016; Muff, Kapalka & Dyllick, 2017; Golding et. al, 2017), organizations at the local level still lack robust access to aligning their strategies and practices with global SDGs.

This study provides a pilot methodological paradigm to measure SDG alignment of local co-operatives based on their mission statements and further comparatively analyze their different levels of SDG alignment in an integrated manner. However, this scale of analysis only can capture the potential role that existing co-ops can play in the communities and we are not attempted to apply it as an integrated approach to measuring organizational SDG performance at the practical level. However, it would be possible to apply the framework if performance data and operational metrics were available. Concurrently, due to the limitation of our dataset, the results of comparing SDG performance among various co-op sectors need to be justified and might not be transferable to other contexts, but the process of localizing SDGs itself can be used in similar studies and the localized SDG framework fits in a more specific locally Canadian

context. As such, synthesizing assessments of organizational sustainability is suggested for further studies not only at the normative, but also the strategic and practical levels.

2.6 Conclusions

Achieving meaningful progress towards the SDGs will require concerted effort throughout societies everywhere. In this context, the role that co-operatives can play in advancing the SDGs has been promoted by a number of organizations (ILO, 2014; ILO and ICA 2014). We examine the extent to which the purposes of existing co-operatives operating in a local Canadian context align with the SDGs after first localizing the globally stated SDGs for a Canadian context. Results indicate that the stated purposes of most (146 of 179) co-operatives studied aligned with at least one of the SDGs (Figure 1b). However, three or more SDGs were explicitly supported by only 34% of the studied co-ops (61 of 179), 18% of co-ops (33 of 179) had purposes that aligned with none of the SDGs. This could be caused by the limitation of only using mission statement as the corporate textual dataset. While socioeconomic development goals were more frequently supported by the purposes of the studied co-operatives, environmental improvement-related SDGs were largely ignored with the exception of the relatively few co-ops operating in either the fishery or forestry sectors whose purposes addressed aspects of natural resource management.

There were clear patterns of more or less alignment with the SDGs and certain attributes of the co-ops studied. Non-profit and consumer-member co-ops tended to align more heavily with the SDGs and displayed more frequent alignments with multiple (three or more) SDGs than any other co-op sub-set considered. In particular, service sector and older (established prior to 2006) housing sector co-ops displayed stronger alignment with the SDGs (Figure 3).

As the SDGs were developed to address global-scale challenges and our work was undertaken in a very specific industrialized nation context, it was necessary to develop a locally

expressed version of the SDGs. This methodological practice can be applied in any setting though resulting locally specified SDGs will inevitably vary. As importantly, the analytical approach used here can also be applied in the analysis of other organisational forms beyond co-operatives. Undertaking similar research on co-operatives elsewhere as well as other forms of organization in a variety of settings would help illuminate the potential forms of organization that may already be well positioned to support achieving the SDGs. However, what remains unaddressed in any further application of this study is the extent to which co-operatives and other forms of organization could address the SDGs not only from their statement but also in their operation as well.

Chapter 3 Conclusions

3.1 Thesis summary

Given the focus of promoting, enhancing and implementing the SDGs everywhere, there is a prompt need for private organizations implement and advance SDGs. In recent literature and practice, the focus has so far been on why and how to implement, measure and report SDG progress for large organizations at global and national levels (Davis, Matthews, Szabo, & Fogstad, 2015; Stafford-Smith et al., 2017; Rosati & Faria, 2019). In contrast, how to deal with the complexity of embracing the SDG agenda and enhance policy coherence from the global to local levels is equally important but much less explored. From an organizational perspective, there is also an urgent need to develop a holistic approach to assessing corporate sustainability performance across sectors both in terms of methodological practice and practical aspects (Battaglia et al., 2016; Maas, Schaltegger, & Crutzen, 2016b; Reimsbach, Hahn, & Gürtürk, 2018). Moreover, as Rosati and Faria (2019) have argued, conducting SDG assessments across organizations is more easily undertaken at a larger scale than it is when working with smaller organizations especially at the local scale. An important reason stated from studies is that while the accessibility of resources for large organizations tends to be strongly connected with the facilitation of SDGs, the need of and access to SDG tracking and reporting is limited to smaller organizations (Udayasankar, 2008; Shabana, Buchholtz, & Carroll, 2016; Rosati & Faria, 2019). In light of the widely recognized need to translate and operationalize the globally expressed SDGs at sub-national scales, and the parallel challenge of undertaking corporate sustainability assessment at the local level, this work set out to develop a qualitative approach that transformed the SDGs into a locally-oriented applicable SDG framework as a tool that could then be used to assess the extent to which the purpose of co-operatives operating locally align with the SDGs.

In this research, I assessed the alignment of the purposes of 179 Nova Scotia-based co-operatives against a localized SDG framework tailored for the Canadian context. I did this through a four step process as first described in Chapter 1: 1) interpret the SDGs for a local Canadian context; 2) identify the linkages among the localized SDGs and further develop a text-based SDG framework that could be used for organizational sustainability assessment; 3) assemble text-based descriptions of the mission statements of Nova Scotia-based co-ops and then analyze the textual data in terms of their alignment with the previously developed localized SDG framework; and 4) compare the SDG frequency of sampled co-ops with a set of co-op attributes or characteristics include co-op age, sector, membership structure and profit status. Methods performed in this study encompasses textual content analysis, organizational mission statement analysis and statistical analysis as first introduced in Chapter 1 and then more explicitly described by a step-by-step analytical process in Chapter 2. Results of SDG localization and co-operative SDG performance were represented and discussed respectively in Chapter 2.

3.2 Significance and limitations

Concurrent with the United Nations release of the SDGs in 2015 as a global framework to guide sustainable development over the period from 2015 to 2030, a number of international organizations, sectors and industries that work with co-operatives declared the significance of the co-operative model for furthering the SDGs (ILO & ICA, 2014; ICA, 2015; Sarker, Sultana, & Mahumud, 2016). However, empirical insights for supporting this assertion is underexplored especially at the local scale. In response, I set out to explore the extent to which co-operatives active in the world had purposes that actually align with the SDGs. Though undertaken at a very small and local scale (Nova Scotia), results of my study revealed that mission statement from a majority of sampled co-operatives (146 of 179) aligned with at least one of the SDGs, although

a relatively small number (34%) fulfilled their alignment with multiple SDGs and a substantial minority (18%) did not align with any SDGs. While most co-ops have advanced the socioeconomic-related SDGs especially in poverty reduction, infrastructure enhancement, and community services (Goals 1, 9 and 11), the majority of environmental-oriented SDGs are not explicitly supported by the NS-based co-op assessed (Figure 1a and 1b). This was especially the case with respect to water conservation and climate change (Goals 6 and 13). These results align with prior observations that the foremost commitments of co-ops are likely to be related to advancing socioeconomic goals and targets with the SDGs (ILO, 2014). A study conducted by Sarker, Sultana and Mahumud (2016) identified the seemingly important role of local co-operatives on promoting the health-related SDGs by supporting universal health coverage in Bangladesh, although there was no further analysis regarding how well the local co-operatives were aligning with any specific SDGs or targets. More importantly, the results of my study also suggest that not every co-operative, or at least amongst those active in Nova Scotia, have purposes that align with advancing the SDGs, and particularly in the area of environmental achievement. Given the evidence of the very mixed nature of co-op purpose alignment with the SDGs, it is clear that many more empirical studies should be undertaken to further elucidate the extent to which earlier statements of “well-placed” (p. 4, ICA & ILO, 2014), “substantial” and “unique” (p.14, ILO, 2014) contributions that co-operative can make to achieving the SDG agenda are reflective of reality.

In addition, my research has also illustrated how the globally-developed SDGs can be translated or downscaled for use as a practical tool or framework for assessing the purposes of organizations. This localized interpretation and analysis of the global SDG framework can be further adapted to other local communities to identify their SDGs and targets. Similarly, as to the findings of this study, Petal and her colleagues (2017) targeted more specifically at SDG 11

and localised goal 11 by proposed indicators at the municipal level in South Africa. Although a shift has been seen on driving local concerns from the MDGs to the SDGs, Patel and colleagues (2017) noted that given the ambiguity and multi-scalar nature of the SDG framework, local policies, regulations and governance were necessary to be referred to in the process of localization, especially regarding environmental policies. More specifically, understanding and identifying the textual logic behind the global SDGs is of great importance when conducting qualitative analysis based on SDGs. Understanding the various types of relationships amongst the SDGs is essential when undertaking this sort of analysis and should be of value to other scholars with an interest in undertaking similar semi-deductive coding strategies when qualitatively assessing local co-operatives or any other form of business organization with the SDGs. In the case of this study, I articulate four types of relationships amongst the SDGs (mutually supporting, relying and supporting, bidirectional enabling and single directional enabling; Table 4) that occur not only in the localized SDGs but also amongst their sub-targets as well. Other studies have also identified similar patterns. For example, Le Blanc (2015) also identified interactive relationships amongst the SDGs and targets through network mapping and further maintained that the potential linkages among SDGs were presented unclearly in the global SDG agenda and that it was therefore essential to consider the multi-linkages when undertaking any sort of analyses using the SDGs. It is important to note that negative relationships among the SDGs, identified by other studies (Coopman, Osborn, Ullah, Auckland, & Long, 2016; Nilsson, Griggs, & Visbeck, 2016), are not explored in this study, due to the scope of analysis (the polarity of relations among SDGs are not decisive in identifying the overlap between co-ops' statement and SDGs) and other objective constraints.

It is also important to recognize that this study was undertaken at a very small scale in what might be a very unusual or idiosyncratic setting in which co-operatives operate. Despite this

possibility, there is nothing to suggest that Nova Scotia or Nova Scotia-based co-operatives are an unusual or somehow atypical setting in which to study co-ops. Although methods used in this study can be adapted and used elsewhere to measure organizational alignment with the SDGs at the strategic level, there has yet to be an develop an integrated approach developed for assessing organizational SDG performance and further combining it with organizational reporting and management at the practical level. Due to the limitation of my dataset, and in particular it is focused on co-ops' stated purposes, the results of comparing SDG alignment among various co-op sectors might not be transferable to other contexts, nor does it provide a basis upon which to judge the operational performance of the co-ops against the SDGs. Although it would be ideal to synthesize sustainability progress and performance of various local co-ops in terms of the SDGs and in terms of their age, profit status, industry and organizational structure, I concur with Maas and colleagues (2016b) that “there is no one-size-fits-all approach” (p. 241) when undertaking sustainability assessments. In the specific context of this study, the aim was to assess organizational sustainability alignment at the strategic level. Consequently, developing integrative approaches to manage, assess and report practical sustainability performance of organizations is suggested for further research. Also, this study applied a semi-deductive strategy in the coding process for textual analysis. Although some codes were inductively generated from mission statements of co-operatives, most of the coding categories were based on strictly deductive coding from localized SDGs. This could potentially influence the generality of the results, and thematic coding is recommended for further studies. In addition, this study only used co-op mission statements as the basis upon which to understand corporate purposes. Further research for similar purposes could include a broader suite of corporate data at the operational level (e.g. corporate strategies, annual reports, and other discourses).

3.3 Further research

The localized SDG framework represented in this study illustrates that the global SDGs can be a transferrable and portable agenda to fulfill the scope of local sustainable development. Given the extensive concern in Canada, national sustainability plans together with regional and local strategies are designed to meet the global SDGs (Santiago, 2014; Government of Canada, 2016; Biggs & McArthur, 2018; Roseland & Spiliotopoulou, 2018). In this study, local sustainability policies and government plans have played an indispensable role throughout the process of transferring and interpreting the global SDGs. As such, it is suggested that efforts are necessary to consider for enhancing local policy and strategies in align with the SDGs as a way to mitigate the practical challenges of applying the global SDGs in a local context. Specifically, further research can be focused on the directionality and polarity of relations among SDGs at the target level, and more importantly, on developing a coherent and feasible decision-making process for organizations and stakeholders, especially at the local level, to identify their priorities and assessing their performance in relation to furthering the SDGs.

To date, only a few studies have provided empirical insight into the extent to which local co-ops or other locally-based private organizations help facilitate achieving the global SDGs. For instance, Abraham and Pingali (2017) identified the potential SDGs related to poverty, nutrition, social and environmental progress and how they could be supported by small agriculture organizations in different regions around the world. Though it employed very different methods, Abraham and Pingali's results also found that among different types of organizations, there were advantages of the agriculture co-operative model in terms of providing an equal basis for accessing markets, capital and technologies (Abraham & Pingali, 2017). However, the authors also noted that there were many more challenges for small agriculture sector actors in advancing the environmental SDGs (particularly in goals 12, 13 and 15), a

finding broadly similar to the results of this study. Similarly, Prasad and Kumari (2016) undertook a comparative case study analysis to analyze the extent which the activities of two local agriculture co-ops based in India were able to enhance the SDGs. More studies regarding corporate SDG engagement were often set at a larger scale, where the SDGs could be directly imported to align business intentions or impacts on contributing to the SDGs. One distinctive study done by Kolk, Kourula and Pisani (2017) examined potential impacts of Multinational Enterprises (MNEs) collected from 61 relevant studies on implementing the SDGs. It was concluded that insights of corporate performance on SDGs could be either positive or negative depending on the extent to which businesses have been involving with the SDGs and where the key actors they have been playing in facilitating the SDGs. However, similar studies have not been found at the local level yet.

In addition to these SDG-related corporate studies, there are also number of case studies mentioned in Chapter 2 in which researchers have assessed the sustainability performance of individual co-operatives or other private organizations (See sections 2.2. and 2.5). Particularly among those studies, de Villiers, Rouse, and Kerr (2016) and Vitale et al. (2019) have adopted holistic approaches in their individual-based case studies to assess corporate sustainability performance based on methods combining sustainability accounting, reporting and performance control. Beyond those individual co-operative cases responding on SDGs, however, there is a clear need for many more studies that assess the co-op model and other organizational forms from a sustainability perspective, and in particular in light of the SDGs in a collective, comparable and balanced manner.

Appendix A. Alignment between Seven Co-operative Principles and Sustainable Development Goals (including targets) in a Local Context

Supplemental Table 1. Alignment between Co-op principles and SDGs in a local context

Note. Association between co-op principles and SDGs are identified at all scales. However, association between the principles and SDG targets have only been identified in a local Canadian context in this study. Text in this table is derived directly from the original description of the SDGs (UNGA, 2015) and the Co-operative principles documented in ICA (1995).

Co-operative Principles	Definition	Associated SDGs	Associated targets in a local context
1 Voluntary and Open Membership	Co-operatives are voluntary organizations', open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.	5 Gender equality	5.1 Against gender discrimination.
		10 Reduced inequalities	10.2 Social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.
2 Democratic Member Control	Co-operatives are democratic organizations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary cooperatives members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner.	5 Gender equality	5.5 Women's equal participation and opportunities for leadership at all levels of decision-making in political, economic and public life.
		10 Reduced inequalities	10.2 (Described above)
		16 Peace, justice and strong institutions	16.7 Responsive, inclusive, participatory and representative decision-making.
		5 Gender equality	5.5 (Described above)

Co-operative Principles	Definition	Associated SDGs	Associated targets in a local context
3 Member Economic Participation	Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing their cooperative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; and supporting other activities approved by the membership.	8 Decent work	8.5 Full and productive employment and decent work for all women and men, and equal pay for work of equal value.
		10 Reduced inequalities	10.2 (Described above)
5 Education, Training and Information	Co-operatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their co-operatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of co-operation.	4 Quality education	4.3 Equal access for all women and men to affordable quality technical, vocational and tertiary education.
			4.5 Eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable.
6 Cooperation Among Co-operatives	Co-operatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures.	16 Peace, justice and strong institutions	16.6 Effective, accountable and transparent institutions.
			16.7 Responsive, inclusive, participatory and representative decision-making.

Co-operative Principles	Definition	Associated SDGs	Associated targets in a local context
		17 Partnerships for the goals	17.17 Effective public, public-private and civil society partnerships.
7 Concern for Community	Co-operatives work for the sustainable development of their communities through policies approved by their members.	4 Quality education	4.7 Ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of cultures contribution to sustainable development.
		12 Responsible consumption and education	12.8 Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

Appendix B. Alignment between Canadian localized Sustainable Development Goals (SDGs) and Federal Sustainable Development Strategies (FSDS) in Canada (2016-2019)

Supplemental Table 2. Alignment between Canadian localized SDGs and FSDS (2016-2019)

Note. This SDG framework presented in Appendix B is only applicable in a Canadian, localized, and private organizational-oriented context. Based on the criteria of national or regional development stage, geographical scale, and stakeholder involvement, only 61 targets in 17 SDGs were included in this SDG localized framework, with exceptions of 107 other SDG targets included in the global SDG framework. Please refer to Section 2.3, Chapter 2 for more specific information regarding the down-scaling process of the SDGs. Regular text in this table is deprived directly from the original description of the SDGs (UNGA, 2015) and the FSDS (Government of Canada, 2016). Type G indicates 12 long-term Goals from the FSDS (excluding the Goal of Low-Carbon Government in a private-organizational context). Among selected FSDS goals and targets, Type T indicates mid-term Targets under each of the 14 Goals, and Type A indicates contributing Actions that can facilitate the achievement of Goals and Targets in the FSDS.

SDGs	Associated FSDS	Type	Outline	Description	
SDG 1 No poverty 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	Clean energy	G	All Canadians have access to affordable, reliable and sustainable energy		
	Clean drinking water	G	All Canadians have access to safe drinking water and, in particular, the significant challenges Indigenous communities face are addressed		
		A	Provide support for water and wastewater services	Through funding and in-kind support, enable delivery of drinking water and wastewater services in First Nations communities, beginning with the highest-risk water and wastewater systems	
	Sustainable food	T	Safe and accessible food supply	Ensure safe and accessible food supply by mitigating risks to animal and plant resources from pests, diseases and other health hazards and prevent risks to health of Canadians	
		A	Provide a food subsidy	Provide a subsidy for perishable, nutritious food so that Northerners living in isolated communities have increased access to affordable healthy food.	
Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion			

SDGs	Associated FSDS	Type	Outline	Description
SDG 1 No poverty 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	Modern and resilient infrastructure	T	Investment in green infrastructure	Provide funding for green infrastructure initiatives that reduce GHG emissions and improve climate resilience and environmental quality
	Effective action on climate change	A	Provide in-kind support and funding for climate resilience	Provide funding for First Nations and Inuit communities to develop: Provide funding for First Nations and Inuit communities to develop: Climate change adaptation strategies; Action plans for community-based climate change adaptation research and assessment projects; and Regional health adaptation plans. Support adaptation projects in various sectors to improve training, build capacity, support evaluation, and promote information sharing, with a focus on northern transportation infrastructure.
SDG 2 Zero hunger 2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	Sustainable food	T	Safe and accessible food supply	Ensure safe and accessible food supply by mitigating risks to animal and plant resources from pests, diseases and other health hazards and prevent risks to health of Canadians
		A	Provide a food subsidy	Provide a subsidy for perishable, nutritious food so that Northerners living in isolated communities have increased access to affordable healthy food.

SDGs	Associated FSDS	Type	Outline	Description
SDG 2 Zero hunger 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	Sustainable food	A	Increase knowledge of sustainable agriculture, fisheries and aquaculture	Conduct scientific research to increase knowledge of effects from agriculture and aquaculture on the environment. This research can assist in addressing agri-environmental challenges such as water quality and water use, developing resilience to a changing climate, and maintaining ecosystem health. Conduct targeted regulatory research on fish pest and pathogen interactions, ecosystem management and interactions with wild populations as well as collaborative research to improve environmental decision making and sustainability of the aquaculture industry contributing to the production of seafood.
		A	Promote innovation and sustainable practices	Build the capacity of Canada's agriculture, agri-food and agri-based products sector to promote innovation and encourage adoption of sustainable agricultural practices at farm and landscape levels by working with provinces and territories.
SDG 2 Zero hunger 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	Sustainable food	T	Sustainable agriculture	By 2030, agricultural working landscapes provide a stable or improved level of biodiversity and efficient management towards water and soil quality for food production
		T	Sustainable aquaculture	By 2020, all aquaculture in Canada is managed under a science-based regime that promotes the sustainable use of aquatic resources (marine and freshwater) in ways that conserve biodiversity

SDGs	Associated FSDS	Type	Outline	Description
SDG 2 Zero hunger 2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	Sustainable food	A	Build capacity for conservation activities	Engage Canadians in stewardship activities to protect and conserve natural spaces and wildlife species and their habitats
SDG 3 Good health and well-being 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	Safe and healthy communities	G	All Canadians live in clean, sustainable communities that contribute to their health and well-being	
SDG 3 Good health and well-being 3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol				
SDG 3 Good health and well-being 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all				

SDGs	Associated FSDS	Type	Outline	Description
SDG 3 Good health and well-being 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Safe and healthy communities	A	Better understand air pollutants and harmful substances	Conduct scientific research and analysis to better understand the sources and effects of outdoor air pollutants, indoor air pollutants and chemical substances. These activities will focus on better understanding and managing the health risks to Canadians; identifying and addressing the effects of air pollution on ecosystems and wildlife; Conduct research and track harmful substances in the environment, including contaminant levels in the Canadian North.
		A	Provide information to inform action and decision making	Provide information to help Canadians understand air quality in their area, support decision making by federal custodians of contaminated sites, and help Canadians take action to reduce their exposure to harmful substances and air pollutants.
		A	Work with partners on outdoor air quality and chemicals management	Work with stakeholders to address indoor and outdoor air quality, including reducing GHG emissions from the transportation, industrial and energy sectors. Participate in joint initiatives to manage risks posed by harmful substances to nature and water
		A	Prevent environmental emergencies or mitigate their impacts	Collaborate with partners to protect Canadians and their environment from the effects of emergency pollution incidents by providing science-based expert advice and regulations.
	Modern and resilient infrastructure	G	Work with partners on green infrastructure	Work with other stakeholders to implement shared approaches to improving water and wastewater infrastructure, as well as support actions to reduce GHG emissions and improve air quality.

SDGs	Associated FSDS	Type	Outline	Description
	Pristine lakes and rivers	G	Clean and healthy lakes and rivers support economic prosperity and the well-being of Canadians	
		A	Work with partners on water quality and ecosystem health	Improve water quality and restore ecosystems, collaborate with other governments, Indigenous Peoples and regional stakeholders to reduce phosphorus in Lake Winnipeg and in the Great Lakes
	Clean drinking water	A	Work with partners on drinking water quality	Support all First Nations communities in the ongoing monitoring of on-reserve drinking water quality. This includes working with provinces and territories to develop and update national health-based drinking water quality guidelines/guidance documents.
SDG 4 Quality education 4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education	Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion	
SDG 4 Quality education 4.3 By 2030, ensure equal access for all women and men to affordable quality technical, vocational and tertiary education, including university				
SDG 4 Quality education 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship				

SDGs	Associated FSDS	Type	Outline	Description
SDG 4 Quality education 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations				
SDG 4 Quality education 4.7 By 2030, ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of cultures contribution to sustainable development	Healthy wildlife populations	A	Build capacity and promote education	Build partners' capacity to protect, conserve and restore species and their habitat
	Effective action on climate change	A	Provide in-kind support and funding for climate resilience	Support adaptation projects in various sectors to improve training, build capacity, support evaluation, and promote information sharing, with a focus on northern transportation infrastructure.
		A	Support voluntary action to reduce GHG emissions and adapt to climate change	Support businesses and Canadians in taking action to reduce GHG emissions. This work includes energy efficiency programs and information; promoting sustainable consumption and production and the use of lower-carbon-footprint materials in construction; plans to address GHG emissions from the rail sector; developing standards to support resilience, with a focus on infrastructure

SDGs	Associated FSDS	Type	Outline	Description
	Connecting Canadians with nature	A	Promote public participation	Provide opportunities for Canadians to connect with nature through learning, outreach and multi-media initiatives in their communities. Work with partners, facilitate specific opportunities for youth, young adults and new Canadians to learn about, experience, and share their encounters with Parks Canada and its network of places. Continue efforts to increase participation in nature-based programs and visitation to national wildlife areas.
SDG 4 Quality education 4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all	Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion	
SDG 5 Gender equality 5.1 End all forms of discrimination against all women and girls everywhere				
SDG 5 Gender equality 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life				

SDGs	Associated FSDS	Type	Outline	Description
SDG 6 Clean water and sanitation 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	Clean drinking water	G	All Canadians have access to safe drinking water and, in particular, the significant challenges Indigenous communities face are addressed	
SDG 6 Clean water and sanitation 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations				
SDG 6 Clean water and sanitation 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	Clean drinking water	A	Provide support for water and wastewater services	Through funding and in-kind support, enable delivery of drinking water and wastewater services in First Nations communities, beginning with the highest-risk water and wastewater systems
	Modern and resilient infrastructure	A	Work with partners on green infrastructure	Work with other stakeholders to implement shared approaches to improving water and wastewater infrastructure, as well as support actions to reduce GHG emissions and improve air quality.
	Pristine lakes and rivers	A	Work with partners on water quality and ecosystem health	Improve water quality and restore ecosystems, collaborate with other governments, Indigenous Peoples and regional stakeholders to reduce phosphorus in Lake Winnipeg and in the Great Lakes

SDGs	Associated FSDS	Type	Outline	Description
		A	Provide in-kind support and funding for projects	Support projects to improve water quality and help restore ecosystems in Lake Simcoe and South-eastern Georgian Bay, the Great Lakes, the St. Lawrence River, and the Lake Winnipeg Basin. Implementation of priority projects will focus on reducing phosphorus inputs, conserving aquatic habitat and species, enhancing research and monitoring capacity essential to the restoration of the watersheds
SDG 6 Clean water and sanitation 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	Clean drinking water	A	Conduct scientific research and analysis to support water resource management	Provide information and statistics on water use, including municipal water treatment.
	Sustainable food	A	Increase knowledge of sustainable agriculture, fisheries and aquaculture	Conduct scientific research to increase knowledge of effects from agriculture and aquaculture on the environment. This research can assist in addressing agri-environmental challenges such as water quality and water use, developing resilience to a changing climate, and maintaining ecosystem health. Conduct targeted regulatory research on fish pest and pathogen interactions, ecosystem management and interactions with wild populations as well as collaborative research to improve environmental decision making and sustainability of the aquaculture industry contributing to the production of seafood.

SDGs	Associated FSDS	Type	Outline	Description
SDG 6 Clean water and sanitation 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	Sustainable food	T	Sustainable aquaculture	By 2020, all aquaculture in Canada is managed under a science-based regime that promotes the sustainable use of aquatic resources (marine and freshwater) in ways that conserve biodiversity
SDG 6 Clean water and sanitation 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	Pristine lakes and rivers	A	Work with partners on water quality and ecosystem health	Improve water quality and restore ecosystems, collaborate with other governments, Indigenous Peoples and regional stakeholders to reduce phosphorus in Lake Winnipeg and in the Great Lakes
		A	Provide in-kind support and funding for projects	Support projects to improve water quality and help restore ecosystems in Lake Simcoe and South-eastern Georgian Bay, the Great Lakes, the St. Lawrence River, and the Lake Winnipeg Basin. Implementation of priority projects will focus on reducing phosphorus inputs, conserving aquatic habitat and species enhancing research and monitoring capacity essential to the restoration of the watersheds
	Sustainably managed lands and forests	A	Better understand lands and forests	Conduct scientific research to better understand protected areas and managed forests and support decision making, including forest management plans. This will include refining our Carbon Budget Model assessing the value of ecosystem services and natural capital developing statistical infrastructure on land cover and land use to monitor changes in the extent of key ecosystem types, including those disturbed by fires, pests and invasive alien species

SDGs	Associated FSDS	Type	Outline	Description
SDG 6 Clean water and sanitation 6.b Support and strengthen the participation of local communities in improving water and sanitation management			Better understand lake and river ecosystems	Conduct scientific research and analysis to better understand lake and river ecosystems, monitor their health, and provide information to support stakeholder decision making and help Canadians monitor the state of lakes and rivers.
SDG 7 Affordable energy 7.1 By 2030, ensure universal access to affordable, reliable, and modern energy services	Clean energy	G	All Canadians have access to affordable, reliable and sustainable energy	
SDG 7 Affordable energy 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies	Clean energy	T	Invest in clean energy technologies	Support the production of renewable electricity and develop technologies related to energy efficiency, natural gas, and renewable energy. Invest in research, development and promotion of clean technologies for electric power generation, reduced emissions from the oil and gas sector, electric vehicle charging infrastructure and energy storage technologies.
		A	Promote collaboration and work with partners on clean energy	Work with partners to improve the development of clean and renewable energy sources
		A	Support voluntary action to reduce GHG and air pollutant emissions through clean energy generation and consumption	Encourage businesses to adopt clean energy technologies through the accelerated capital cost allowance for clean energy generation and by supporting clean energy generation.

SDGs	Associated FSDS	Type	Outline	Description
	Effective action on climate change	A	Conduct climate policy research and analysis	Conduct policy research and analysis to inform strategies to address climate change in different sectors, including agriculture, energy and health.
	Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion	
	Clean growth	A	Invest in technologies to reduce GHG and air pollutant emissions	Support the development, demonstration, commercialization, deployment, adoption and export of technologies that reduce GHG and air pollutant emissions. This work will leverage regional strengths and help to improve productivity, competitiveness, and environmental performance in sectors such as energy, mining, building, and waste management, and the manufacturing sector, including in the aerospace and automotive industries.
		A	Work with partners on developing and adopting new technologies to reduce GHG and air pollutant emissions	Work with provinces, territories, Indigenous communities, business, industry, technology producers, and academia to implement shared approaches to reducing GHG emissions and improving air quality—for example, by promoting the adoption of new technologies and supporting clean technology development and collaborating on strategies to minimize dependence on fossil fuel electricity generation in northern and remote communities, and research, development and demonstration of clean energy technologies.

SDGs	Associated FSDS	Type	Outline	Description
SDG 8 Decent work and economic growth 8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all				
SDG 8 Decent work and economic growth 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value				
SDG 9 Industry, innovation and infrastructure 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion	
		T	Investment in green infrastructure	Funding for green infrastructure initiatives that reduce GHG emissions and improve climate resilience and environmental quality
		A	Work with partners on green infrastructure	Work with other stakeholders to implement shared approaches to improving water and wastewater infrastructure, as well as support actions to reduce GHG emissions and improve air quality.
	Effective action on climate change	A	Provide in-kind support and funding for climate resilience	Provide funding for First Nations and Inuit communities to develop: climate change adaptation strategies; action plans for community-based climate change adaptation research and assessment projects; and regional health adaptation plans. Support adaptation projects in various sectors to improve training, build capacity, support evaluation, and promote information sharing, with a focus on northern transportation infrastructure.

SDGs	Associated FSDS	Type	Outline	Description
SDG 9 Industry, innovation and infrastructure 9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, and their integration into value chains and markets				
SDG 9 Industry, innovation and infrastructure 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	Clean energy	A	Support voluntary action to reduce GHG and air pollutant emissions through clean energy generation and consumption	Encourage businesses to adopt clean energy technologies through the accelerated capital cost allowance for clean energy generation and by supporting clean energy generation.
	Safe and healthy communities	A	Work with partners on outdoor air quality and chemicals management	Work with stakeholders to address indoor and outdoor air quality, including reducing GHG emissions from the transportation, industrial and energy sectors. Participate in joint initiatives to manage risks posed by harmful substances to nature and water
	Clean growth	G	A growing clean technology industry in Canada contributes to clean growth and the transition to a low-carbon economy	

SDGs	Associated FSDS	Type	Outline	Description
SDG 9 Industry, innovation and infrastructure 9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	Clean growth	A	Invest in technologies to reduce GHG and air pollutant emissions	Support the development, demonstration, commercialization, deployment, adoption and export of technologies that reduce GHG and air pollutant emissions. This work will leverage regional strengths and help to improve productivity, competitiveness, and environmental performance in sectors such as energy, mining, building, and waste management, and the manufacturing sector, including in the aerospace and automotive industries.
	Clean energy	T	Invest in clean energy technologies	Support the production of renewable electricity and develop technologies related to energy efficiency, natural gas, and renewable energy. Invest in research, development and promotion of clean technologies for electric power generation, reduced emissions from the oil and gas sector, electric vehicle charging infrastructure and energy storage technologies.
	Safe and healthy communities	A	Invest in technologies to improve outdoor air quality	Make strategic investments in the development, commercialization and adoption of technologies that will improve air quality.
		A	Work with partners on outdoor air quality and chemicals management	Work with stakeholders to address indoor and outdoor air quality, including reducing GHG emissions from the transportation, industrial and energy sectors. Participate in joint initiatives to manage risks posed by harmful substances to nature and water

SDGs	Associated FSDS	Type	Outline	Description
SDG 9 Industry, innovation and infrastructure 9.c Significantly increase access to ICT and strive to provide universal and affordable access to internet in LCDs by 2020				
SDG 10 Reduce inequalities 10.2 By 2030, empower and promote the social, economic and political inclusion of all irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status				
SDG 11 Sustainable cities and communities 11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	Clean energy	G	All Canadians have access to affordable, reliable and sustainable energy	
	Clean drinking water	G	All Canadians have access to safe drinking water and, in particular, the significant challenges Indigenous communities face are addressed	
		A	Provide support for water and wastewater services	Through funding and in-kind support, enable delivery of drinking water and wastewater services in First Nations communities, beginning with the highest-risk water and wastewater systems
	Sustainable food	T	Safe and accessible food supply	Ensure safe and accessible food supply by mitigating risks to animal and plant resources from pests, diseases and other health hazards and prevent risks to health of Canadians
		A	Provide a food subsidy	Provide a subsidy for perishable, nutritious food so that Northerners living in isolated communities have increased access to affordable healthy food.
Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion		

SDGs	Associated FSDS	Type	Outline	Description
SDG 11 Sustainable cities and communities 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	Effective action on climate change	A	Provide in-kind support and funding for climate resilience	Provide funding for First Nations and Inuit communities to develop: climate change adaptation strategies; action plans for community-based climate change adaptation research and assessment projects; and regional health adaptation plans. Support adaptation projects in various sectors to improve training, build capacity, support evaluation, and promote information sharing, with a focus on northern transportation infrastructure.
SDG 11 Sustainable cities and communities 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage	Connecting Canadians with nature	A	Build capacity for conservation activities	Engage Canadians in stewardship activities to protect and conserve natural spaces and wildlife species and their habitats
	Pristine lakes and rivers	A	Provide in-kind support and funding for projects	Support projects to improve water quality and help restore ecosystems in Lake Simcoe and South-eastern Georgian Bay, the Great Lakes, the St. Lawrence River, and the Lake Winnipeg Basin. Implementation of priority projects will focus on reducing phosphorus inputs, conserving aquatic habitat and species enhancing research and monitoring capacity essential to the restoration of the watersheds
	Healthy coasts and oceans	A	Build our knowledge of coastal ecosystems, Marine Protected Areas (MPAs) and fisheries	In support of our work in the Arctic, increase our knowledge of potential impacts of marine accidents on the Arctic environment. Continue to develop draft monitoring protocols for MPAs, provide evidence-based advice to decision makers on marine ecosystems and environmental stressors, and improve our knowledge of fisheries resources, their productivity and factors affecting them to support sustainable fisheries management.

SDGs	Associated FSDS	Type	Outline	Description
	Healthy wildlife populations	A	Build capacity and promote education	Build partners' capacity to protect, conserve and restore species and their habitat
SDG 11 Sustainable cities and communities 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Safe and healthy communities	A	Prevent environmental emergencies or mitigate their impacts	Collaborate with partners to protect Canadians and their environment from the effects of emergency pollution incidents by providing science-based expert advice and regulations.
	Effective action on climate change	A	Develop a solid base of scientific research and analysis on climate change	Conduct scientific research, modelling and analysis to build knowledge of climate change and its impacts—now and in the future, and across different geographic areas—including enhanced monitoring of the health impacts of climate change. Track Canada's GHG emissions, collect GHG emissions data, provide information to support policy development (including regulations) in economic sectors, and provide information to help Canadians make climate-related decisions and prepare for future climate impacts.
		A	Support voluntary action to reduce GHG emissions and adapt to climate change	Support businesses and Canadians in taking action to reduce GHG emissions. This work includes: energy efficiency programs and information; promoting sustainable consumption and production and the use of lower-carbon-footprint materials in construction; plans to address GHG emissions from the rail sector; developing standards to support resilience, with a focus on infrastructure

SDGs	Associated FSDS	Type	Outline	Description
	Clean growth	A	Invest in technologies to reduce GHG and air pollutant emissions	Support the development, demonstration, commercialization, deployment, adoption and export of technologies that reduce GHG and air pollutant emissions. This work will leverage regional strengths and help to improve productivity, competitiveness, and environmental performance in sectors such as energy, mining, building, and waste management, and the manufacturing sector, including in the aerospace and automotive industries.
SDG 11 Sustainable cities and communities 11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	Connecting Canadians with nature	T	Visitation to parks and participation in biodiversity conservation activities	By 2020, maintain or increase the number of Canadians that get out into nature—for example, by visiting parks and green spaces—and increase participation in biodiversity conservation activities relative to a 2010 baseline
	Modern and resilient infrastructure	G	Modern, sustainable, and resilient infrastructure supports clean economic growth and social inclusion	
SDG 11 Sustainable cities and communities 11.a Support positive economic, social and environmental links between urban, per-urban and rural areas by strengthening national and regional development planning	Sustainably managed lands and forests	A	Build capacity and provide support	Provide in-kind support and funding to increase Indigenous communities' participation in Canada's forest sector, administer the Ecological Gifts Program, implement the Natural Areas Conservation Program, and implement the National Wetland Conservation Fund. Support initiatives to combat the spruce budworm in Atlantic and Quebec forests to reduce its negative impacts and create opportunities for economic development in the region.

SDGs	Associated FSDS	Type	Outline	Description
SDG 12 Responsible consumption and production 12.2 By 2030, achieve the sustainable management and efficient use of natural resources	Sustainably managed lands and forests	A	Work with partners	Provide opportunities for collaboration with stakeholders, Indigenous communities and organizations, and work with domestic and international partners to implement joint initiatives. Manage risks to natural resource sectors, infrastructure and human health by providing scientific knowledge through the National Forest Pest Program.
	Sustainable food	T	Sustainable aquaculture	By 2020, all aquaculture in Canada is managed under a science-based regime that promotes the sustainable use of aquatic resources (marine and freshwater) in ways that conserve biodiversity
	Clean drinking water	A	Conduct scientific research and analysis to support water resource management	Provide information and statistics on water use, including municipal water treatment.
SDG 12 Responsible consumption and production 12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	Sustainable food	T	Safe and accessible food supply	Ensure safe and accessible food supply by mitigating risks to animal and plant resources from pests, diseases and other health hazards and prevent risks to health of Canadians
	Modern and resilient infrastructure	A	Work with partners on green infrastructure	Work with other stakeholders to implement shared approaches to improving water and wastewater infrastructure, as well as support actions to reduce GHG emissions and improve air quality.
	Safe and healthy communities	A	Work with partners on outdoor air quality and chemicals management	Work with stakeholders to address indoor and outdoor air quality, including reducing GHG emissions from the transportation, industrial and energy sectors. Participate in joint initiatives to manage risks posed by harmful substances to nature and water

SDGs	Associated FSDS	Type	Outline	Description
SDG 12 Responsible consumption and production 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	Clean growth	A	Invest in technologies to reduce GHG and air pollutant emissions	Support the development, demonstration, commercialization, deployment, adoption and export of technologies that reduce GHG and air pollutant emissions. This work will leverage regional strengths and help to improve productivity, competitiveness, and environmental performance in sectors such as energy, mining, building, and waste management, and the manufacturing sector, including in the aerospace and automotive industries.
	Safe and healthy communities	A	Support voluntary action to reduce outdoor air pollutant emissions	Encourage businesses and Canadians to reduce air pollutant emissions, including through the use of targeted economic instruments. This approach includes the imposition of a levy payable by manufacturers or importers of certain fuel-inefficient passenger vehicles.
		A	Provide in-kind support and funding to reduce outdoor air pollutants	Support projects and activities that help reduce outdoor air pollutants from the marine sector by funding the installation of marine shore power facilities at Canadian ports.
SDG 12 Responsible consumption and production 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle				
SDG 12 Responsible consumption and production	Connecting Canadians with nature	G	Canadians are informed about the value of nature, experiencing nature first hand, and actively engaged in its stewardship	

SDGs	Associated FSDS	Type	Outline	Description	
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature		A	Build capacity for conservation activities	Engage Canadians in stewardship activities to protect and conserve natural spaces and wildlife species and their habitats	
		A	Promote public participation	Provide opportunities for Canadians to connect with nature through learning, outreach and multi-media initiatives in their communities. Work with partners, facilitate specific opportunities for youth, young adults and new Canadians to learn about, experience, and share their encounters with Parks Canada and its network of places. Continue efforts to increase participation in nature-based programs and visitation to national wildlife areas.	
	Healthy wildlife populations	A	Build capacity and promote education	Build partners' capacity to protect, conserve and restore species and their habitat	
	Effective action on climate change		A	Provide in-kind support and funding for climate resilience	Support adaptation projects in various sectors to improve training, build capacity, support evaluation, and promote information sharing, with a focus on northern transportation infrastructure.
			A	Support voluntary action to reduce GHG emissions and adapt to climate change	Support businesses and Canadians in taking action to reduce GHG emissions. This work includes energy efficiency programs and information; promoting sustainable consumption and production and the use of lower-carbon-footprint materials in construction.
	Pristine lakes and rivers	A	Better understand lake and river ecosystems	Conduct scientific research and analysis to better understand lake and river ecosystems, monitor their health, and provide information to support stakeholder decision making and help Canadians monitor the state of lakes and rivers.	

SDGs	Associated FSDS	Type	Outline	Description
	Clean drinking water	A	Conduct scientific research and analysis to support water resource management	Provide information and statistics on water use, including municipal water treatment.
	Safe and healthy communities	A	Provide information to inform action and decision making	Provide information to help Canadians understand air quality in their area, support decision making by federal custodians of contaminated sites, and help Canadians take action to reduce their exposure to harmful substances and air pollutants.
SDG 12 Responsible consumption and production 12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products				
SDG 13 Climate Action 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Healthy coasts and oceans	A	Build our knowledge of coastal ecosystems, Marine Protected Areas (MPAs) and fisheries	In support of our work in the Arctic, increase our knowledge of potential impacts of marine accidents on the Arctic environment. Continue to develop draft monitoring protocols for mpas, provide evidence-based advice to decision makers on marine ecosystems and environmental stressors, and improve our knowledge of fisheries resources, their productivity and factors affecting them to support sustainable fisheries management.
	Effective action on climate change	A	Conduct climate policy research and analysis	Conduct policy research and analysis to inform strategiesto address climate change in different sectors, including agriculture, energy and health.

SDGs	Associated FSDS	Type	Outline	Description
		A	Provide in-kind support and funding for climate resilience	Provide funding for First Nations and Inuit communities to develop: climate change adaptation strategies; action plans for community-based climate change adaptation research and assessment projects; and regional health adaptation plans. Support adaptation projects in various sectors to improve training, build capacity, support evaluation, and promote information sharing, with a focus on northern transportation infrastructure.
		A	Develop a solid base of scientific research and analysis on climate change	Conduct scientific research, modelling and analysis to build knowledge of climate change and its impacts—now and in the future, and across different geographic areas—including enhanced monitoring of the health impacts of climate change. Track Canada's GHG emissions, collect GHG emissions data, provide information to support policy development (including regulations) in economic sectors, and provide information to help Canadians make climate-related decisions and prepare for future climate impacts.
		A	Support voluntary action to reduce GHG emissions and adapt to climate change	Support businesses and Canadians in taking action to reduce GHG emissions. This work includes: energy efficiency programs and information; promoting sustainable consumption and production and the use of lower-carbon-footprint materials in construction; plans to address GHG emissions from the rail sector; developing standards to support resilience, with a focus on infrastructure

SDGs	Associated FSDS	Type	Outline	Description
	Modern and resilient infrastructure	T	Investment in green infrastructure	Funding for green infrastructure initiatives that reduce GHG emissions and improve climate resilience and environmental quality
	Sustainable food	A	Increase knowledge of sustainable agriculture, fisheries and aquaculture	Conduct scientific research to increase knowledge of effects from agriculture and aquaculture on the environment. This research can assist in addressing agri-environmental challenges such as water quality and water use, developing resilience to a changing climate, and maintaining ecosystem health. Conduct targeted regulatory research on fish pest and pathogen interactions, ecosystem management and interactions with wild populations as well as collaborative research to improve environmental decision making and sustainability of the aquaculture industry contributing to the production of seafood.
SDG 14 Life below water 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution				
SDG 14 Life below water 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	Healthy coasts and oceans	T	Marine conservation	By 2020, 10% of coastal and marine areas are conserved through networks of protected areas and other effective area-based conservation measures
		A	Protect and manage marine and coastal areas	Adopt an integrated management approach for ocean activities.

SDGs	Associated FSDS	Type	Outline	Description
SDG 14 Life below water 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	Healthy coasts and oceans	A	Build our knowledge of coastal ecosystems, Marine Protected Areas (MPAs) and fisheries	In support of our work in the Arctic, increase our knowledge of potential impacts of marine accidents on the Arctic environment. Continue to develop draft monitoring protocols for mpas, provide evidence-based advice to decision makers on marine ecosystems and environmental stressors, and improve our knowledge of fisheries resources, their productivity and factors affecting them to support sustainable fisheries management.
		A	Work with partners to protect and restore coastal ecosystems	Provide opportunities for collaboration and work with domestic and international partners to protect and restore coastal ecosystems.
SDG 14 Life below water 14.b Provide access for small-scale artisanal fishers to marine resources and markets				
SDG 15 Life on land 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Sustainably managed lands and forests	A	Better understand lands and forests	Conduct scientific research to better understand protected areas and managed forests and support decision making, including forest management plans. This will include refining our Carbon Budget Model, assessing the value of ecosystem services and natural capital developing statistical infrastructure on land cover and land use to monitor changes in the extent of key ecosystem types, including those disturbed by fires, pests and invasive alien species

SDGs	Associated FSDS	Type	Outline	Description
SDG 15 Life on land 15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	Sustainably managed lands and forests	G	Lands and forests support biodiversity and provide a variety of ecosystem services for generations to come	
SDG 15 Life on land 15.8 By 2020, introduce measures to prevent and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	Healthy wildlife populations	G	All species have healthy and viable populations	
	Connecting Canadians with nature	A	Build capacity for conservation activities	Engage Canadians in stewardship activities to protect and conserve natural spaces and wildlife species and their habitats
	Pristine lakes and rivers	A	Provide in-kind support and funding for projects	Support projects to improve water quality and help restore ecosystems in Lake Simcoe and South-eastern Georgian Bay, the Great Lakes, the St. Lawrence River, and the Lake Winnipeg Basin. Implementation of priority projects will focus on reducing phosphorus inputs conserving aquatic habitat and species enhancing research and monitoring capacity essential to the restoration of the watersheds
	Sustainably managed lands and forests	A	Better understand lands and forests	Conduct scientific research to better understand protected areas and managed forests and support decision making, including forest management plans. This will include: refining our Carbon Budget Model assessing the value of ecosystem services and natural capital developing statistical infrastructure on land cover and land use to monitor changes in the extent of key ecosystem types, including those disturbed by fires, pests and invasive alien species

SDGs	Associated FSDS	Type	Outline	Description
SDG 15 Life on land 15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	Sustainably managed lands and forests	A	Build capacity and provide support	Provide in-kind support and funding to increase Indigenous communities' participation in Canada's forest sector, administer the Ecological Gifts Program, implement the Natural Areas Conservation Program, and implement the National Wetland Conservation Fund. Support initiatives to combat the spruce budworm in Atlantic and Quebec forests to reduce its negative impacts and create opportunities for economic development in the region.
SDG 15 Life on land 15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	Sustainably managed lands and forests	A	Work with partners	Provide opportunities for collaboration with stakeholders, Indigenous communities and organizations, and work with domestic and international partners to implement joint initiatives. Manage risks to natural resource sectors, infrastructure and human health by providing scientific knowledge through the National Forest Pest Program.
SDG 16 Institutions 16.6 Develop effective, accountable and transparent institutions at all levels				
SDG 16 Institutions 16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	Sustainably managed lands and forests	A	Build capacity and provide support	Provide in-kind support and funding to increase Indigenous communities' participation in Canada's forest sector, administer the Ecological Gifts Program, implement the Natural Areas Conservation Program, and implement the National Wetland Conservation Fund.
	Connecting Canadians with nature	A	Promote public participation	Continue efforts to increase participation in nature-based programs and visitation to national wildlife areas.

SDGs	Associated FSDS	Type	Outline	Description
	Effective action on climate change	A	Support voluntary action to reduce GHG emissions and adapt to climate change	Support businesses and Canadians in taking action to reduce GHG emissions. This work includes energy efficiency programs and information; promoting sustainable consumption and production and the use of lower-carbon-footprint materials in construction; plans to address GHG emissions from the rail sector; developing standards to support resilience, with a focus on infrastructure
	Clean growth	A	Support voluntary action to reduce GHG and air pollutant emissions	Encourage businesses, provinces, territories and Canadians to take action to reduce GHG and air pollutant emissions—for example, by supporting businesses, including co-operatives and other social enterprises, with sustainability goals and green technology projects; supporting and providing accreditation for GHG and air pollutant emissions verification; developing and promoting standards and codes of practice that promote environmental sustainability
SDG 17 Partnerships 17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	Clean energy	A	Promote collaboration and work with partners on clean energy	Work with partners to improve the development of clean and renewable energy sources
	Healthy coasts and oceans	A	Work with partners to protect and restore coastal ecosystems	Provide opportunities for collaboration and work with domestic and international partners to protect and restore coastal ecosystems.

SDGs	Associated FSDS	Type	Outline	Description
	Sustainably managed lands and forests	A	Work with partners	Provide opportunities for collaboration with stakeholders, Indigenous communities and organizations, and work with domestic and international partners to implement joint initiatives. Manage risks to natural resource sectors, infrastructure and human health by providing scientific knowledge through the National Forest Pest Program.
	Healthy wildlife populations	A	Build capacity and promote education	Build partners' capacity to protect, conserve and restore species and their habitat

Appendix C. Coding Report

Supplemental Table 3. Coding report from Nvivo

No.	Name of Codes	Type	Coding References
1	No poverty	Deductive	55
1.4	Basic services and economic resources	Deductive	48
1.4.1	Inclusive access to basic services	Deductive	37
1.4.1.1	Public transportation	Deductive	4
1.4.1.2	Natural resources and energy	Deductive	2
1.4.1.3	Clean water and sanitation	Deductive	0
1.4.1.4	Affordable food services	Deductive	3
1.4.1.5	Affordable health-care services	Deductive	1
1.4.1.6	Affordable and quality education	Deductive	3
1.4.1.7	Affordable and accessible housing services	Deductive	24
1.4.1.7.1	Affordable housing (especially for the poor)	Semi-inductive	21
1.4.1.7.2	Access to housing services (especially for the vulnerable)	Semi-inductive	3
1.4.2	Inclusive access to economic resources	Deductive	10
1.4.2.1	Ownership and control over land & properties	Deductive	4
1.4.2.2	Financial services and investment	Deductive	4
1.4.2.3	Appropriate and new technology	Deductive	1
1.4.3	Other accessible and affordable services and economic resources	Semi-inductive	8
1.4.3.1	Affordable funeral services	Semi-inductive	1
1.4.3.2	Affordable publications	Semi-inductive	1
1.4.3.3	Accessible and affordable artworks and art-related facilities;	Semi-inductive	6
1.5	Resilience of the poor and the vulnerable to climate change, and other economic, social and environmental shocks	Deductive	0
2	Zero hunger	Deductive	50
2.1	Safe, nutritious and sufficient food that is accessible	Deductive	15
2.3	Resources provided for small-scale food producers	Deductive	28
2.4	Sustainable food production and practices in agriculture, fisheries and aquaculture	Deductive	2
2.5	Genetic diversity of seeds, plants, and animals	Deductive	5

No.	Name of Codes	Type	Coding References
3	Good health and well-being	Deductive	15
3.4	Promote mental health and well-being	Deductive	7
3.5	Prevention and treatment of drug and alcohol abuse	Deductive	0
3.8	Safe, effective, quality and affordable health-care services	Deductive	7
3.9	Reduce deaths from chemicals, air, water, and soil	Deductive	1
4	Quality education	Deductive	42
4.2	Access to quality early childhood development, care and pre-primary education	Deductive	1
4.3	Affordable and quality technical, vocational and tertiary education	Deductive	3
4.4	Technical and vocational skills for employment and entrepreneurship	Deductive	10
4.5	Education and vocational training for all	Deductive	3
4.7	Knowledge and skills for promoting sustainable development	Deductive	16
4.a	Inclusive and effective learning environment for all	Deductive	9
5	Gender Equality	Deductive	2
5.1	Against gender discrimination	Deductive	1
5.5	Women's full participation and equal opportunities in politics, economy and public life	Deductive	1
5.b	Technology (especially ICT) to promote the empowerment of women	Deductive	0
6	Clean water and sanitation	Deductive	2
6.1	Access to safe and affordable drinking water	Deductive	0
6.2	Access to adequate and equitable sanitation and hygiene	Deductive	0
6.3	Improve water quality	Deductive	0
6.4	Increase water-use efficiency	Deductive	0
6.5	Integrated water resources management through cooperation	Deductive	0
6.6	Protect water-related ecosystems (mountains, forests, wetlands, waters)	Deductive	2
6.b	Strengthen local communities in improving water and sanitation management	Deductive	0

No.	Name of Codes	Type	Coding References
7	Affordable energy	Deductive	6
7.1	Affordable, reliable and modern energy services	Deductive	2
7.a	Access to clean energy research and technology	Deductive	4
7.a.1	Promote renewable energy and energy efficiency	Deductive	2
7.a.2	Research and investment in clean energy technology and energy infrastructure	Deductive	2
8	Decent work and economic growth	Deductive	16
8.5	Full employment and decent work for all	Deductive	13
8.1	Strengthen the capacity of domestic financial institutions to provide banking, insurance and financial services for all	Deductive	3
9	Industry, innovation and infrastructure	Deductive	82
9.1	Sustainable, resilient and affordable infrastructure	Deductive	51
9.1.1	Green infrastructure	Deductive	1
9.1.1.1	Clean energy infrastructure	Deductive	1
9.1.1.2	Modern water and wastewater facilities	Deductive	0
9.1.2	Social infrastructure	Deductive	44
9.1.2.1	Housing infrastructure	Deductive	24
9.1.2.1.1	Affordable housing infrastructure	Semi-inductive	21
9.1.2.1.2	Quality housing infrastructure for the vulnerable	Semi-inductive	3
9.1.2.2	Cultural and recreational infrastructure	Deductive	12
9.1.2.3	Health-care infrastructure (especially for seniors)	Deductive	5
9.1.2.4	Early learning and child-care infrastructure	Deductive	1
9.1.3	Public transit infrastructure	Deductive	4
9.1.4	Other affordable infrastructure investments	Deductive	2
9.3	Promote small-scale industrial and other enterprises into markets	Deductive	21
9.4	Upgrade and retrofit industries with resource-use efficiency and clean technologies	Deductive	6
9.5	Enhance scientific research and technological capabilities	Deductive	4
9.c	Increase access to ICT	Deductive	0
10	Reduce inequalities	Deductive	21

No.	Name of Codes	Type	Coding References
10.2	Inclusion of all irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	Deductive	21
11	Sustainable cities and communities	Deductive	53
11.1	Adequate, safe and affordable housing and basic services	Deductive	36
11.1.1	Affordable housing	Deductive	22
11.1.2	Affordable public transit	Deductive	4
11.1.3	Affordable and quality education	Deductive	3
11.1.4	Affordable food services	Deductive	3
11.1.5	Affordable energy services	Deductive	2
11.1.6	Affordable health-care services	Deductive	1
11.1.7	Affordable funeral services	Semi-inductive	1
11.2	Safe, affordable, accessible and sustainable transport system (especially for the vulnerable)	Deductive	4
11.4	Protect cultural and natural heritage	Deductive	7
11.6	Reduce the environmental impact of cities through pollution and waste management	Deductive	1
11.7	Safe, inclusive and accessible green spaces	Deductive	4
11.a	Support regional development planning	Deductive	1
12	Responsible consumption and production	Deductive	30
12.2	Sustainable management and efficient use of natural resources	Deductive	10
12.4	Chemicals and all wastes management to minimize adverse impacts on human health and the environment	Deductive	2
12.5	Reduce waste generation (through prevention, reduction, recycling and reuse)	Deductive	1
12.6	Report sustainable practices and sustainability information	Deductive	0
12.8	Awareness of sustainable development and lifestyles	Deductive	17
12.b	Tools to monitor sustainable development impacts for sustainable tourism	Deductive	0
13	Climate action	Deductive	0
13.3	Education, awareness and capacity	Deductive	0

No.	Name of Codes	Type	Coding References
13.3.1	Improve education, awareness-raising on climate change	Deductive	0
13.3.2	Improve human and institutional capacity on climate change	Deductive	0
14	Life below water	Deductive	9
14.1	Reduce marine pollution	Deductive	0
14.2	Sustainably manage and protect marine and coastal ecosystem	Deductive	1
14.3	Minimize and address the impacts of ocean acidification including through scientific cooperation	Deductive	0
14.b	Promote small-scale artisanal fishers	Deductive	8
15	Life on land	Deductive	6
15.2	Sustainable management of forests	Deductive	5
15.4	Conservation of mountain ecosystems	Deductive	0
15.8	Prevent and reduce of invasive alien species and control the priority species	Deductive	0
15.a	Mobilize financial resources to sustain biodiversity and ecosystems	Deductive	0
15.b	Finance sustainable forest management	Deductive	1
16	Institutions	Deductive	21
16.6	Effective, accountable and transparent institutions	Deductive	14
16.7	Responsive, inclusive, participatory decision-making	Deductive	7
17	Partnerships	Deductive	23
17.17	Promote public, public-private and civil society partnerships	Deductive	23

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