# Integrating a Triple Bottom-Line Approach into the Management System: A Framework for Institutions and Businesses Alike

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# Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners. I understand that my thesis may be made electronically available to the public.

# Abstract

Organizations are increasingly considering a transition to a more sustainable management approach, primarily as a result of drivers related to operational efficiency, regulatory compliance, and corporate reputation. Accordingly, organizations that are adapting to this trend are often gaining a competitive edge. Though research has linked industrial ecology to sustainable business, there is a void on the practical level that leaves businesses unequipped to implement this approach, now commonly known as triple bottom-line management. In response, this paper uses concepts of material flow analysis to create a multi-sectoral framework that guides organizations through the process of achieving a triple bottom-line management system. Specifically, the framework outlines a set of steps and considerations for comprehensive assessment, indicator development, measurement schemes, and reporting that are necessary to achieve an integrated result.

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# Chapter 1: Introduction

## Overview

Organizations are facing new challenges when it comes to ensuring profit. Aging infrastructure, rising utility costs and commodity prices, tighter legislation and standards, and stakeholder pressure are driving business trends in a new direction. Specifically, organizations are pursuing sustainability as a comprehensive cutting edge tool that includes environmental and social in addition to economic motivations. (Hoffman and Woody 2013; Blizzard and Klotz 2012; Carroll and Buchholtz 2011; Rasmussen 2011; Walton and Galea 2005; Azapagic 2003; Karapetrovic 2003, Azapagic and Perdan 2000) Reducing waste and lowering energy costs is no longer enough; organizations are looking to take further steps by integrating sustainability principles within their overall management plan.

Currently, sustainability focused management plans remain fragmented and ineffective in terms of both application and operation, largely due to the fact that this process has not been clearly defined in a common operations framework. (Hoffman and Woody 2013; Esquer-Peralta et al. 2008; Bagheri and Hjorth 2007; Hjorth and Bagheri 2006; Krajnc and Glavič 2005a; Azapagic 2003; Karapetrovic 2003; Kirkland and Thompson 1999) In response, this paper offers a management framework for organizations that are looking to connect financial, natural, and human capital to the bottom-line, also known as triple bottom-line management. In particular, the framework provides sequential guidance on preparing and operating a measurable triple bottom-

line management system using an organization's own value system, which follows a process of organizational assessment, indicator development, monitoring, and reporting. The intention is to boost the resiliency of an organization in the face of emerging trends related to organizational efficiency, regulatory compliance, and stakeholder reputation (Holdsworth 2003) through a holistic approach common to most organizations.

In many organizations, sustainability-related principles are often only seen in superficial ways, such as in the mission statement or policies, as compared to day-to-day operations. Incomplete uptake can be attributed to a lack of clear and concise procedures to guide the process on both a strategic and operational level. For the most part, research and professional contribution in this area focuses on assessments, indicator development, or reporting separately as opposed to the process as a whole. (Hoffman and Woody 2013; Rassmussen 2011; Bertels et al. 2010; Kirkland and Thompson 1999; Azapagic 2003) For a management system to be viable, it must be given legs to stand on, including appropriate actions and tools to operate and measure the performance of the management plan.

There are practical restrictions as well. Though formal sustainability-related certifications exist, they tend to be out of reach for many smaller to mid-sized organizations because they are resource intensive in terms of both cost and manpower. Prominent examples include ISO's environmental (ISO 14001: 2004) and energy management (ISO 15001: 2001) standards, the Association for Advancement of Sustainability in Higher Education's (AASHE) Sustainability, Tracking, and Rating System (STARS) assessment framework for educational institutions (AASHE 2010), and the Global Reporting Initiative's (GRI) reporting framework. (GRI 2002a)

Further, contributions tend not to deal with management systems commonly; rather, they tend to focus on sectors that experience more resource flows, such as manufacturing and larger, more resource intense businesses. Another limitation is that many existing frameworks do not

consider sustainability as a whole, tending to give priority to the economic drivers, such as quality control. Using efficiency, compliance, and reputation as drivers, this paper showcases a practical process of integrating a triple bottom-line approach into the management system, reflective of an organization's own value structure.

This paper argues that the lack of practical guidance is a large contributor to the limited uptake. In response, the framework uses material flow analysis (MFA) concepts to identify and frame the organizational inputs, processes, and outputs within an organization. In MFA, the organization is a system made up of many parts, all of which function because of materials, energy, and information that enter and flow through the organization. Materials are the physical resources coming into the organization, energy is what transforms the materials into products, and information includes the information that informs interactions.

Materials, energy, and information enter and move through and out of the organization by means of administrative and operational controls, which are based on the overall mission of the organization.  The MFA approach works to define and connect stocks and flows by assessing the inputs, processes, and outputs within a system. This approach fits well with research on sustainable management, because (like the concept of sustainability) MFA provides a comprehensive approach to problem solving in terms of both impacts and associations. (Tahir and Darton 2010; Azapagic and Perdan 2000)

Accordingly, the MFA approach informs the steps of the framework, which include a thorough assessment of the organization, development of indicators based on the assessment, which are then used to guide the measurement and verification process. The framework includes both the strategic and operational components of a management system and how each guides the other to create a holistic and informed approach. Within the framework, organizational strategy directs day-to-day procedures and standards based on the overall mission of the organization, as translated through

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administrative controls such as policies and master plans. The functionality of the operational system will help determine the relevance of the administrative strategy.

Considering the nature of the framework, the research question undertaken is:

*Is it possible to develop a cross-sectoral and comprehensive framework for management systems that integrates triple bottom-line concepts as derived from the MFA approach of identifying material, energy, and information flows? Further, what elements would such a framework need to include to achieve this end?*

## Scope and Objectives

Using academic, professional, and personal contributions, the core analysis of the literature review and method deals with existing frameworks that help operationalize sustainability management systems, with particular emphasis on those that use the material flow analysis approach. Accordingly, the framework is based on critical reflection of literature, which led to the selection of material flow analysis as an appropriate method, given its uptake among both academics and practitioners in the area of sustainable management systems. With a focus on resource flow and management, material flow analysis is commonly linked to systems thinking and ultimately industrial ecology in terms of application within organizations.

Additionally, I am drawing from professional practice in sustainability management to supplement the technical concept of material flow analysis and help verify the approach, which benefits critical reflection. My practice in sustainability management includes experience in the

private, public, consulting, and non-profit sectors spanning areas of business and facilities operations, capital planning, design, and construction, programming and education, and stakeholder partnerships. Duties span the technical, administrative, and strategic scope of management from the data analysis, measurement, and reporting process to organizational wide strategic planning.

The resulting framework is intended for a variety of scenarios, from use in small businesses with no structured management system, to larger organizations that wish to streamline and package existing operations, administration, and strategy for a more formal approach. However, the framework is likely to be more relevant for small to medium sized organizations that are unable to find a relevant framework to their sector or do not have the capacity to manage a resource intensive standard or certification, such as ISO. Broadly speaking, the framework is also for organizations that are unable to find a framework that deals with triple bottom-line management holistically.

# Chapter 2: Background

For the most part, organizations have been interpreting sustainable practices in terms of resource efficiencies. Naturally, increasing efficiency by minimizing wastes is good practice; however, organizations are increasingly looking for a more holistic approach. Considering its ecological, economic, and social framing, sustainability is increasingly seen as valuable part of a comprehensive management system, which is generically known as a triple bottom-line approach. Figure 1 represents the concept of triple bottom-line in business, as it will be applied in this paper.

**Natural Capital**

Ecosystems, EH&S, geography = Land use, habitat management, air quality, food health, invasive species

**Financial & Built Capital**

Supply-chains, resource management, policy, development = Local economies, material flows, continuous improvement, life-cycle management

**Human Capital**

Env justice, poverty & human rights, diversity & equity, governance, community = access to resources, community partnerships, fair trade, child labour & poverty

Figure 1: An outline of triple bottom-line's contribution to profit (Khalili 2011) by way of improving efficiency, compliance, and reputation of an organization.

To address the research question, it is necessary to outline the development of sustainability and triple bottom-line approaches in business. The notion of sustainability has strong lineage to the study of ecology, which revolves around the interplay and dependence of relationships in terms of how elements work together as a part of an overall whole, or system. (Ehrenfeld 2007, 2004) Systems exist as a series of common interactions; each with numerous subsystems that experience change and evolution. (Bossel 1999)

German biologist Ernst Haeckel first posed the word 'ecology' in 1869, defining it as "the study of the natural environment including the relations of organisms to one another and to their surroundings." (Odum and Barrett 2004) The scientific study in ecology dates from approximately 1900, but has become part of public conversation only in the last few decades. Initially the field included just animal ecology and plant ecology, but was later linked to the physical processes through food chain studies by Frederick E. Clements and Victor E. Shelford and through material cycling concepts by Raymond Lindeman and G. Evelyn Hutchinson, which served as the basis for the contemporary field of industrial ecology. (Odum et al. 1971)

Like the goals of sustainability, the industrial ecology approach is comprehensive. Industrial ecology approaches issues of sustainability from multiple perspectives, predominantly through aspects of sociology, the environment, economy and technology, and uses the analogy of natural systems as an aid in understanding how to design sustainable industrial systems. (Allenby 2006; Huber 2000) When designing sustainable systems, material flow analysis is a natural approach within industrial ecology and systems thinking in order to gather the full spectrum of information necessary to manage an entire management system. With this information, the MFA approach

provides the intermediary between the theory of industrial ecology and systems theory and application within an organization.

## Sustainability and the Triple Bottom-Line

As the field of industrial ecology progressed and the impacts of climate change became more obvious, sustainability rose as a natural consideration to new and intricate challenges. (Blizzard and Klotz 2012; Berkes et al. 2000) The most widely known definition of sustainability comes from the 1987 World Commission on Environment and Development and attempts to balance economic and ecological concerns of meeting current needs without compromising the needs of future generations. (Brundtland 1987) The concept of sustainability gained momentum in the 1980s and 1990s following the World Commission and the 1992 UN Summit on Environment and Development in Rio de Janeiro as well as increasing academic and public activity in the field. (Rasmussen 2011; Tahir and Darton 2010)

## Environmental, Social, and Economic Elements

Sustainability involves environmental, social, and economic elements in order to deal with mitigation of and adaptation to changing climate. Elements of sustainability often overlap so that environmental benefits lead to stronger social performance that then attracts stakeholder interest

to improve economic strength. (Khalili 2011; Rasmussen 2011; Berkes et al. 2000) In business, sustainability implies that management practices should be based on environmental knowledge and social mechanisms to enhance long-term performance. (Carroll and Buchholtz 2011; Berkes et al. 2000)

Environmental aspects of sustainable business traditionally involve issues surrounding wastes (Daly 1997) and management of non-renewable resources via ecosystem health, integrity, and resilience. (Khalili 2011) Social sustainability in business includes the ability to benefit human health and improve social equity. (Rasmussen 2011; Edwards 2010) Specific areas of interest include fair distribution and access to resources, human rights, sharing of power, and education. (Carroll and Buchholtz 2011; Khalili 2011; Daly et al. 1994) Internally, social sustainability programming can help build a sense of community by embracing diversity and promoting tolerance and compassion. (Rasmussen 2011)

With economic sustainability, importance is placed on maintaining capacity and net benefits for current and future societies by considering such things as inflation and unemployment rates, fair trade, qualitative measures, and life cycle costing. (Carroll and Buchholtz 2011; Khalili 2011; Bernardo et al. 2009; Shriberg 2002; Daly et al. 1994; Daly 1997) These considerations help close loops and minimize waste by looking at areas that may not have been a key consideration in traditional economics. (Hoffman and Woody 2013; Walton and Galea 2005; Azapagic 2003; Karapetrovic 2003; Anderberg 1998)

Economist John Elkington coined the term triple bottom-line in 1994 as reaction against the prevailing narrow view of economics. (Carroll and Buchholtz 2011; Rasmussen 2011; Elkington 1998) There are several types of capital in the triple bottom-line approach to business. Social/human capital exists in the form of labour, culture, and organization; economic capital includes financial elements such as cash, investments, and monetary instruments as well as manufactured elements fundamental to infrastructure, machines, tools and factories necessary for existing levels of production; and natural capital includes ecological resource systems and services. (Carroll and Buchholtz 2011; Rasmussen 2011; Hawken et al. 2013) With the triple bottom-line approach, the economy is reliant on society, and both the economy and society are located within the environment. (Rasmussen 2011; Willard 2012)

Still, sustainability is regularly misunderstood as being in opposition to economic success instead of being a natural and necessary component of long-term economic viability and success. However, the view of sustainability as an adversary is constantly improving as organizations look for simple guidance to make changes that will improve their triple bottom-line. Considering footprint, organizations have the power to make significant contributions to overall goals of sustainability as well as to their own business.

## Resource Consumption

In recent years, emissions from industrial sources have reduced significantly, primarily because of waste minimization, recycling and composting, life-cycle analysis practices, and environmental auditing. (Walsh et al. 2006; Anderberg 1998) Still, humanity currently expends over 500 exajoules of primary energy and extracts 60 billion tons of raw materials annually. (Weisz and Steinberger 2010) Naturally, such a high level of production contributes to major changes to the landscape and the climate. (Weisz and Steinberger 2010; Odum et al. 1971)

When considering the role of industrial ecology in relation to the triple bottom-line approach, it is easy to see the impact that action or inaction can have in business. (Walton and Galea 2005) Economic, social, and environmental challenges will vary depending on the scale and sector of the business; some may just see slight utility increases and others may deal with increasingly rigid compliance measures. In some instances, businesses may see significant benefit by capitalizing on new trends, while for others it is just good planning to know where your business stands. (Hoffman and Woody 2013; Walton and Galea 2005)

Accordingly, many organizations are taking initiative to confront developments around regulatory compliance, improved efficiency, and reputation. Given the systems nature of an organization, actions that improve compliance have the capacity to affect efficiency levels as well as stakeholder image, and vice versa. Improvements to one area will almost always influence improvements in the others.

Compliance refers to how an organization manages requisite standards, legislation, and other procedures common or specific to the industry. In an organization, compliance ensures that all safety, environmental, quality, human and financial resource objectives comply with applicable regulatory and corporate obligations. (Carroll and Buchholtz 2011; Holdsworth 2003) Compliance measures are changing, largely due to efficiency requirements and stakeholder pressure, and failure to comply can incite implications that range from fines, to losing suppliers and customers, to suspension of operations.

Naturally, potential for cost savings is one of the main drivers for embracing a triple bottom-line approach. Traditionally, savings come from reducing the costs associated with resource waste and health, safety and labour of workers, which can translate to higher productivity and less spent on damages and lost time. (Gupta 1995) Though this is obvious to most organizations, many struggle with realizing these cost reductions given the multifaceted nature of resource flows through an organization.

Lastly, business activity is becoming more and more transparent, which means there are implications on stakeholder perception. Stakeholders are assessing companies based on social and

environmental as well as economic performance. (Carroll and Buchholtz 2011; Allenby 2000) Stakeholder concern extends to the entire life-cycle of a product, including where it comes from, how it was made and transported, and where it goes at end of life. This concern, and increased demand for transparency, has pushed businesses to develop divisions that deal specifically with social liability and community relations. (Carroll and Buchholtz 2011)

## Directing Sustainable Business

The systems approach helps to simplify the decision-making process within the management plan by drawing on key business inputs and outputs that guide the design, management, and communication process. (Esquer-Peralta et al. 2008; Azapagic 2003; Jonker and Karapetrovic 2004; Karapetrovic 2003) The inputs and outputs are chosen based on the organization's overarching strategy, and are then integrated within the management approach via guiding documents, such as policies, plans, standards, and procedures. (Blizzard and Klotz 2012; Azapagic 2003; Holdsworth 2003)  An overarching strategy must also be designed to accommodate potential changes. (Hjorth and Bagheri 2006; Jonker and Karapetrovic 2004; Karapetrovic 2003)

To maintain and adapt organizational strategy, there must be communication from top to bottom and vice versa, which centralizes the business process, creating clear goals and natural feedback. To realize this feedback loop, the organization must create a set of indicators that are based on its key inputs and outputs.

Sustainability assessments and reporting frameworks include indicators, which are used to measure performance. The purpose of developing indicators is to offer a means of summarizing and focusing the complexities of an organizational to manageable amounts of significant information. (Bond and Morrison-Saunders 2011; Bell and Morse 2008; Krajnc and Glavič 2005a; Spangenberg 2002) Ultimately, indicators bring together strategic information that supports the goals of the total system. (Krajnc and Glavič 2005a; Azapagic and Perdan 2000; Bossel 1999)

Indicators can be used to break down a complicated system into smaller units to improve the decision-making process, or to incorporate a broader area, such as ecological impacts. (Bond and Morrison-Saunders 2011; Bell and Morse 2008; Spangenberg 2002; Bossel 1999) The former approach is termed reductionism because it draws on a small number of indicators to represent the whole system. (Bond and Morrison-Saunders 2011; Bell and Morse 2008) This approach has been criticized for neglecting the relationship between variables that contribute to a well-functioning system. (Cashmore 2004) Alternatively, holism believes that some systems cannot be fully understood by breaking them down to components – a practice that limits understanding of how units interact or will interact as a whole system. (Bond and Morrison-Saunders 2011; Bell and Morse 2008)

Further, indicators can be qualitative or quantitative; they result from attributed values of the organization and can also be used to instill new values. (Meadows 1998) Quantitative indicators are the easiest to measure because they are determined using a calculable metric, such as the change in physical size of a building. Qualitative indicators also have a numeric metric attached to them, but rather than measuring something concrete, like size, they measure the change of judgment or

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perception and can be discovered through such things as surveys and questionnaires. (Bertel et al. 2010; Church and Rogers 2006; Azapagic and Perdan 2000) Quantitative or qualitative, indicators that promote a triple bottom-line approach are highly transferable across organizations and sectors, given the shared desire to improve efficiency, compliance levels, and reputational standing. This similarity facilitates comparison and benchmarking. (Tahir and Darton 2010)

In essence, indicators help anticipate and assess conditions and trends, which then enable the organization to formulate and communicate strategies. (Bond and Morrison-Saunders 2011) Consequently, indicators must be developed within the parameters of a coherent framework to be a part of an overall process improvement effort. (Singh et al. 2009; Warhurst 2002; Azapagic and Perdan 2000) Still, sustainability-related indicators are not often being used at the senior, strategic decision-making level, or even in managing supply chains or business units. (Tahir and Darton 2010; Searcy 2009; Azapagic and Perdan 2000; Bossel 1999)  This absence is likely due a lack of correlation between organizational goals and the actions that will implement and measure success, which requires an extensive assessment process.

## Summary

Companies often struggle with management strategies because of changing scope and lack of guidance; organizations must be able to respond within their management system. In terms of its relationship to industrial ecology and systems thinking, the material flow analysis approach provides the means for an organization to get a clear and full picture of movements and interactions within the management system, particularly with goals of triple bottom-line management. The expansion of ecological study to its industrial application creates a holistic approach that is characteristic of conservation management, not just in terms of environmental impact, but economic and social as well.

Triple bottom-line management strengthens resilience through improvements to operational efficiency, overall reputation, and the ability to be compliant to internal and external requirements. The forces driving efficiency, compliance, and reputation are interrelated: success or failure in one area will almost certainly affect one or both of the other key areas. Organizations that consider these drivers are better placed than competitors to deal with contemporary and emerging trends. (Walton and Galea 2005) A triple bottom-line approach to management covers the traditional paradigms while also confronting new challenges.

# Chapter 3: Literature Review

The overall purpose of the literature review is to demonstrate the role of systems thinking in applying a triple bottom-line management approach, specifically in terms of material flow analysis. The material in the review is drawn from the field of industrial ecology, including applications in sustainable organizational management systems. Industrial ecology is a fitting approach because it is operational in nature and involves the interaction of complex systems as a whole, which is the aim for a triple bottom-line approach to business.

Considering the research question, the review identifies existing contributions and frameworks in this area and how they contribute, or fall short, to the approach illustrated and developed here. The subsequent methods chapter then describes the approach to the framework presented here. The framework is the product that derives from existing approaches in theory and practice, in addition to the author's professional experience.

## Systems Thinking

The systems approach analyzes how individual interactions work together to produce outcomes, by providing systematic guidance towards a more sustainable business. (Esquer-Peralta et al. 2008; Hjorth and Bagheri 2006; Azapagic 2003) In systems thinking, the organization operates as a single system of functional processes as opposed to many systems operating in isolation. (Hjorth and Bagheri 2006; Karapetrovic 2003; Berkes and Folke 1998) Through these interactions, systems thinking further supports triple bottom-line management by promoting the ability to change and adapt in order remain viable as well as sustainable. (Bossel 1999)

Accordingly, systems' thinking is a common approach for academic contributions in this area. (Esquer-Peralta et al. 2008; Hjorth and Bagheri 2006; Azapagic 2003; Karapetrovic 2003; Clayton and Radcliffe 1996) In most cases, the systems approach is used as a way to explain how the elements of sustainability can interact in an organization, as opposed to applying the notions to generate a management system. Nevertheless, the organization must understand these interactions before they can be adequately implemented; material flow analysis provides the means to study inputs and outputs within a system, which in this case refers to business operations.

## Inputs and Outputs

Organizational management systems are made up of common structures, processes, hardware, software, facilities, and people that work together to produce the product, service, and culture of an organization. In accordance with the systems approach, the series of practices that make up the management system are understood in the context of relationships rather than in isolation. (Esquer-Peralta et al. 2008; Azapagic 2003; Clayton and Radcliffe 1996) The series of inputs and outputs of organizational flows provide the information for designing, managing, communicating, and maintaining the management system. (Azapagic 2003)

Inputs, outputs and the processes involved throughout are made up of materials and energy. Materials are tangible items necessary for administrative functions, such as computers and pens, or production, such as screws and bolts, as well as raw materials, such as concrete and plastics. Energy is the intangible items necessary to power organizational functions, such as utilities, and can be purchased off site or produced on site. Human driven information is also necessary to exchange and develop, such as meetings and professional development. (Barles 2010; Brunner and Rechberger 2004; Anderberg 1998)

## Open and Closed Systems

Open and closed systems are illustrative of the difference between informal or formal approaches to management (Clayton and Radcliffe 1996; Holdsworth 2003), with this paper

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contributing to the latter. Organizations move toward a more formal system as they improve the controls and performance of their management system. Informal systems range from organizations with no outlined work procedures, to those with designated in-house procedures. Formal systems abide by a set of verified regulations and generally require thorough internal and external auditing. Though formal systems are subject to more regulation, virtually all organizations are required to gather data to report in one manner or another.

In general, the more open a system is to variable elements, the more susceptible it is to complications. (Clayton and Radcliffe 1996) Open systems operate more organically, which can foster creativity and flexibility, but because of this they tend to lack guidance, which makes them unable to easily respond to complications. On the other hand, a closed system includes a set of formalized parameters, which essentially equip an organization with the mechanisms to operate. Parameters range from daily operations meetings, to written work procedures outlining duties and health and safety requirements, to organizational mission and values.

In addition to reporting, gathering and managing data provides the organization with the necessary information to improve performance. A formal structure aims to regulate operations for better control and the feedback of information supports longer-term planning. (Holdsworth 2003; Clayton and Radcliffe 1996) Communication failure between departments or the mis-calibration of a building automation system can disrupt the quality of service, ultimately increasing risk in business operations in terms of ability to be compliant, efficient and reputable.

Transition to a formal approach requires careful planning throughout the process of designing and maintaining the management system. (Holdsworth 2003) To do this, a thorough assessment of the inputs, processes, and outputs of an organization must take place to determine a comprehensive action plan, which is guided by key goals. In order to maintain the management system and report on its progress, the organization must follow or determine a set of indicators.

The indicators represent key aspects of the management system; they help to drive continuous improvement by focusing the flow of resources.

## Performance Measurement

### *Indicators*

Given the value of indicators as an organizational performance management tool, there has been a significant rise in the development of indicators over the last couple of decades, with the Global Initiative for Sustainability Ratings (GISR) citing over 1500 sustainability related indicators spanning almost 600 issues. Naturally, the immense number of indicators does not allow for much consistency in terms of corporate measurement of sustainability. However, in recent years, there has been a push to create a globally accepted indicator framework, which is seen through several contributions for organizational management, most notably from the International Integrated Reporting Council's (IIRC) International Framework, the Balanced Scorecard, the World Business Council for Sustainable Development's (WBCSD) Measuring Impact Framework, as well as key academic contributions. (Azapagic and Perdan 2000)

The International Integrated Reporting Council and Balanced Scorecard provide an integrated way to consider the whole of a management system, which includes sustainability, whereas WBCSD frames the indicators within the scope of sustainability, including economic, environmental, and social elements. The former approach places emphasis on the structure and

value of an organization to develop indicators, while the latter structures the indicators based on the three pillars of sustainability. Alternatively, while IIRC and the BSC (particularly BSC) respond to the drivers of the organization, they lack focus on the role of triple bottom-line, which limits the capacity of the organization to accomplish this approach.

In response, some academic contributions have applied sustainability principles to the Balanced Scorecard approach. (Figge et al. 2002a, b) Figge et al. (2000a, b) follow the concepts of Balanced Scorecard (BSC), which links the everyday operations to the long-term business strategy and uses this as the basis to incorporate environmental and social considerations as well. In addition to financial drivers, BSC considers four overall factors, including intellectual capital, the customer perspective, the internal business process and the learning and growth perspective, which include the elements that help achieve the previous considerations. (Figge et al. 2002b) Using the objectives of the organization, corresponding measures are formulated in all four perspectives.

The primary benefit of BSC to this paper is the focus on using organizational values to influence indicator development as opposed to pillars of sustainability, therefore aligning corporate activities according to their strategic relevance to the organization. (Figge et al. 2002a) By focusing on strategy, the relevance of the key business issues can be designated as either core issues or performance drivers so sustainability is not ever seen as a luxury and not something that needs to be monetized. Figge et al. 2002a) Rather, it becomes a part of the business strategy. The BSC approach provides very comprehensive guiding information for identifying key indicators.

Though not related to BSC, other relevant academic contributions include Veleva and Ellenbecker (2001) and Azapagic and Perdan (2000). Both contributions frame the indicators within the pillars of sustainability, which does not promote a value- based approach, however, they

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include processes within indicator development, rather than just guiding principles to consider. The former contribution showcases the flow of organizational resources, including materials and energy, as inputs and outputs but the latter goes further by providing sequential levels of a framework to consider during the indicator development process. The steps include measurement of compliance with regulations or standards, the organizational inputs, outputs and performance, such as emissions, by-products and wastes, worker and public health, the production impacts from supply chain and distribution, use and disposal, and finally, how the organization is perceived in terms of sustainable society. (Searcy 2009; Veleva and Ellenbecker 2001) Veleva and Ellenbecker (2001) demonstrate that indicators must be influenced by the goals as well as the structure of the organization.

However, only some of the approaches provide guidance for developing relevant indicators. IIRC's framework includes very important considerations through guiding principles and elements to include, such as business model and risks; it does not include a process or methods linking the business plan to key values and associated metrics. Similarly, WBCSD includes best practices and considerations as opposed to a method for developing indicators with metrics for the organization. The International Framework, Balanced Scorecard, and WBCSD attempt to address economic performance but they tend to make use of economic indicators that are not necessarily true measures of sustainability, such as sales and market shares. In general, common shortcoming of existing indicator frameworks is the lack of clear and detailed guidance on how to develop and implement the indicators using an informed process, based on internal as well as external reporting requirements. To be relevant to a management system, the indicators must be considered alongside an assessment and action planning process.

## Existing Sustainability Frameworks

The literature reveals that there is a gap between sustainability management systems theory and general practice in business in terms of a holistic approach. The bulk of research and professional contribution in this area focuses on assessments and reporting or specific industry examples rather than the process of general action planning and implementation. (Rassmussen 2011; Bertels et al. 2010; Hoffman and Woody 2013; Azapagic 2003; Kirkland and Thompson 1999) Still, assessment and reporting are essential parts of the process, and often include applicable ranking indicators, which are metrics that help determine levels of success and failure.

## Assessment and Reporting Frameworks

Assessment frameworks are used to evaluate organizational performance, and reporting frameworks guide the reporting process through a set of indicators. In academia, the trend is to use a modular approach by applying the three components of sustainability - economics, environment, and society – to direct the assessment and reporting process. (Tahir and Darton 2010; Singh et al. 2009; Krajnc and Glavič 2005b; Azapagic 2004; Azapagic 2003; Azapagic and Perdan 2000) Generally, the overall goal is to establish a common process by which the state of sustainability within business will be easier to understand, both internally and by external stakeholders.

There are well-known professional examples of assessment frameworks for business and institutions. For educational institutions, AASHE's STARS is the most widely used framework.

STARS 2.0 requires a large amount of highly detailed information, both quantitative and qualitative, for both a baseline and performance year. From this information, post-secondary educational institutions are given a categorical rating, ranging from bronze to platinum. Other lesser-known or utilized frameworks include the Campus Sustainability Assessment Framework (CSAF), and The Natural Step. (Fonseca et al. 2011; AASHE 2010; Good Company 2004; Cole and Wright 2003)

For corporations, the Global Reporting Initiative (GRI) is one of the most notable reporting frameworks. (Fonseca et al. 2012; GRI 2002a) The GRI framework is used by over 4,000 businesses from 60 different countries. GRI Guidelines apply to corporate businesses, public agencies, smaller enterprises, NGOs, industry groups and others. GRI is based on sustainability principles and includes standard disclosures on management approaches to sustainability in terms of environmental, economic, and social impacts. (GRI 2002b; Fonseca et al. 2012; Tahir and Darton 2010; Krajnc and Glavič 2005b) GRI is designed to lend itself to the financial and administrative make-up of the organization, including areas already reported on to minimize overburden.

GRI's first framework version, G1, was launched in 2000 and in 2014 it has graduated to version G4, which is a more user-friendly version meant to increase uptake by consolidating and simplifying reporting criteria. GRI has improved technical definitions of the required disclosures and indicators, become more complimentary to other relevant reporting guidelines, and modified its format to be more user-friendly via templates and web-based administration. (Fonseca et al. 2012) After outlining the criteria to prepare a sustainability report, the second part of G4 provides an implementation manual to help interpret and organize the reporting principles. (Fonseca et al. 2012) However, the implementation manual is not comprehensive in terms of detailing the steps that are required to report accurate and meaningful information, rather, it focuses on defining the contents within the context of sustainability as well as the nature of the report itself.

Industry contributions tend to follow structured approaches that require compliance to specific mandates, however; it is up to the organization to determine how this will look based on individual mission and practices. The International Organization for Standardization (ISO) has developed one of the most extensively used system of third-party certification standards, many of which relate to areas integral to sustainability, such as quality management, energy management, social responsibility, environmental management, and risk management. ISO's environmental management, social responsibility, and energy management standards are the most applicable to this research.

ISO 14000 standards are the most well-known environment-focused frameworks, having been launched in the mid-nineties and implemented by more than 200,000 organizations in almost 160 countries. (ISO 14001: 2004) ISO 14000 requires a business to have procedures in place to ensure compliance with relevant legislation, though it does not actually prescribe specific environmental targets or technologies. (Corbett and Kirsch 2009) This non-prescriptive approach allows for flexibility, though it lacks guidance for organizations unfamiliar with developing indicators.

ISO 26000 is a guide to socially responsible business performance that was launched in 2010. (ISO 26000: 2010) ISO 26000 is not a certifiable standard so is often considered more of an optional asset, as opposed to a necessity. Though it does not provide a certification, ISO 26000 still aims to have practical value by facilitating management routines and practices related to social responsibility. (Hahn 2012)

Launched in 2011, ISO 50001 supports organizations in all sectors to use energy more efficiently through the development of an energy management system (EMS). ISO 50001 is based on the management system model of continual improvement also used for other well-known ISO standards such as ISO 9001 or ISO 14001. This makes it easier for organizations to integrate energy management into their overall efforts to improve quality and environmental management. Other well-known and related non-ISO standards have also been developed for occupational health and safety, such as OHSAS 18001 and CSA Z1000. (Bernardo et al. 2009; Holdsworth 2003)

It is not surprising to see an increase in standards for business systems as the demand for information is increasing from a variety of stakeholders. Investors and analysts are using this information to quantify long-term risk, and customers and employees are increasingly including sustainability as a criterion in decision-making. It is no longer enough to just report on organizational indicators, stakeholders expect to see sustainable practices actively integrated into the management plan and operations. This movement has been termed corporate social responsibility (CSR), triple bottom-line management, environmental, social and governance (ESG), corporate citizenship, and sustainability or sustainable development. The variety and number of terms, however, reflect the lack of standardization in this area.

Supporting the validity of professional contributions, the majority of academic works in this area apply their theory to ISO management systems and the GRI framework. (Singh et al. 2009; Azapagic et al. 2006; Krajnc and Glavič 2005a; Azapagic et al. 2004; Azapagic 2003; Holdsworth 2003; Karapetrovic 2003; Veleva et al. 2001; Veleva and Ellenbecker 2001) ISO and GRI help capture a large amount of information from complex organizations, which in the case of these contributions, involves the analysis of material and energy inputs and outputs of manufacturing industry and processes (i.e., mining, engineering process design, and chemical processing). (Azapagic et al. 2006; Azapagic et al. 2004; Azapagic 2004; Azapagic 2003; Karapetrovic 2003; Veleva et al. 2001; Veleva and Ellenbecker 2001) As these authors demonstrate, a material flow analysis approach relates closely to manufacturing-type industry given the magnitude and variety of flows. However, the overall goal of this work is to provide a general system that can adapt to most companies. All organizations experience flows of materials, energy, and information, which makes the processes used by these authors the most relevant to this paper.

To varying degrees, previous works began with an assessment stage to identify relevant policies, stakeholders, and external pressures. This is followed by the process of creating and integrating key goals, most often cited as indicators. Some contributions also include tools for measuring the success of the indicators, and finally, communicating the sustainability policies and progress through reporting.

A thorough assessment process informs the direction that follows; several key papers elaborate on useful dimensions to consider during this process. To start, the organization must determine the scope of overall business operations being considered, including spatial, temporal,

and administrative parameters. (Tahir and Darton 2010; Bossel 1999) The parameters are the operating mechanisms of the management system that act as a guide for defining and organizing the capabilities of an organization. This process helps to clarify and focus the process of gathering the everyday inputs and outputs under investigation. (Tahir and Darton 2010; Bell and Morse 2008; Shriberg 2001; Fresno and Kroonenberg 1992)

With the scope defined, the organization must then outline its administrative strategies, which starts with organizational mission and guiding principles. Missions are generally supplemented with more specific values and guiding principles, which allow a business to highlight important organizational objectives. The purpose of this step is to create an inventory of activities that relate to the business plan and where there may be a gap. (Tahir and Darton 2010; Walton and Galea 2005; Karapetrovic 2003) After the strategic and administrative structure is clear, the organization analyzes the operational-level flows and how they relate to the strategic ones. Strategic flows guide day-to-day business operations through a set structure, which make up the overall management framework. Once the impacts of these activities are identified as significant, they can be are categorized and associated with measurable indicators.

In most situations, indicators are organized based on the three main areas of sustainable development – economic, environmental, and social. (Azapagic 2003; Bossel 2003; Veleva et al. 2001; Veleva and Ellenbecker 2001) In this approach, the pillars of sustainability drive the overall framework and indicator development process. Conversely, this paper considers that organizations do not frame themselves by sustainability pillars and so the pillars should be applied within the value setting stage of indicator development. Focus should be on the organizational flows, their relationships, and where triple bottom-line principles strengthen this process. To be objective, the organization should include the bottom-line approach within the process of developing indicators, not as the overarching directive; otherwise, the indicators themselves may become subjective.

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In addition to categorization style, many of the works prescribe highly detailed and often specific indicators with associated calculations, i.e., ozone depletion or acidification potential. (Singh et al. 2009; OECD 2001; Azapagic and Perdan 2000) Though this information is highly valuable, it will not be applicable to most operations in terms of subject, applicator, or level of detail. The framework in this paper aims to guide organizations to create indicators based on the framing of their management plan.

Consequently, the management framework presented here benefits from contributions in generic indicator development, including descriptions of normalizing, aggregating, weighing, and attaching metrics. Normalizing is the process of organizing information to minimize extremes, which provides common and translatable material. The information can then be grouped into related topics of interest in a process of aggregation – there can be several indicators within each topic of interest. The next stage is determining level of importance to the organization via a weighing process and finally, metrics are attached to allow the organization to quantitatively measure performance. Several authors cite these processes (Bond and Morrison-Saunders 2011; Krajnc and Glavič 2005a, b; Azapagic 2004; Spangenberg 2002; Azapagic and Perdan 2000; Veleva et al. 2001), but Krajnc and Glavič (2005a, b) provide the most relevant contributions, using all steps.

To summarize, this paper pulls from works that promote a generic process of creating a triple bottom-line approach within the entire management system. Like others, this paper argues that this process must include assessing performance, developing performance indicators, and measuring and reporting on performance, but is unique in providing detailed steps and considerations of each phase that are based on the values of the organization. The steps of the process are made possible through the comprehensive data gathered through the material flow analysis approach within systems thinking.

The literature points to a number of well-established contributions to triple bottom-line frameworks in academic and practice. However, even though metrics are a part of daily business operations, industry has been very slow to track and measure progress relating to sustainable development and even slower in implementing action plans. (Bond and Morrison-Saunders 2011; Searcy 2009; Holdsworth 2003; Azapagic and Perdan 2000) This lag is largely because organizations do not follow a systematic approach to assess, define, and measure indicators. (Bond and Morrison-Saunders 2011; Bossel 1999)

Potential explanations for the slow uptake are that available frameworks tend to be industry specific and onerous to complete, making them resource intensive, in terms of financial and time commitment, for many organizations. The financial commitment includes both purchase of the standard as well as staff for ongoing maintenance and assurance. In addition to limited resources, smaller organizations within non-manufacturing sectors may see available approaches, or at least parts of them, as too detailed or irrelevant because of the focus on material flows and production. Further, the frameworks examined here require that particular elements be achieved before formal certification can take place, with the assumption that the initial commitment, management strategy, and culture already exist. (Kirkland and Thompson 1999)

Moreover, research that does deal with integration tends to rely on particular examples or characteristics of successful integration across various stages of implementation, such as 'having a strong leader' or 'having the support of upper management'. (Bertels et al. 2010; Herremans and Allwright 2000; Gupta 1995) Similarly, these traits are often based on overarching concepts of sustainability, rather than distinct, applied functions. (Bond and Morrison-Saunders 2011; Bertels

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et al. 2010) There are bound to be discrepancies around how the organization frames its operations and sustainability in general, including the interpretation of the assessment and reporting findings. (Bond and Morrison-Saunders 2011) Case studies and 'desired characteristics' are valuable pieces of information for this effort but alone they do not confront the detailed and dependent processes of a management system.

Alternatively, frameworks such as ISO do not confront triple bottom-line in its broadest sense; rather, several of ISO's many frameworks would have to be implemented within an organization for a more holistic approach. Further, ISO does not connect all stages of assessments, indicator development, and reporting, which is required for operating a management system. (Veleva and Ellenbecker 2001; Kirkland and Thompson 1999) Industry frameworks predetermine what will be assessed and reported on. The contributions provide vital pieces to the puzzle, but no one framework is neutral to organizational sector, capacity, and mission.

For the most part, contributions to date do not provide generic and holistic multi-sectoral frameworks. Rather, contributions tend to be prescriptive in terms of values and definitions, incomplete in terms of the focus on one part of the overall process, specific case studies or industries, or too resource intensive in terms of manpower and other resources for smaller organizations. In response, the subsequent method and framework comprise a comprehensive process of the stages and steps necessary to assess, create, and maintain a triple bottom-line management system by pairing the values of the organization with the triple bottom-line approach to create the overall strategy. The framework outlines steps within the both the assessment and indicator development process, which are necessary to measure, report, and improve on performance.

# Chapter 4: Method

The method has been developed through research into academic and professional literature in material flow analysis, management systems, and triple bottom-line, in conjunction with professional practice in the field. Pairing academic research and field application allows for critical reflection. Critical reflection informs the process of generating the process used to create the subsequent framework, which includes inventorying, processing, and verifying activities. Finally, the method outlines an early example of the framework's application within a post-secondary Canadian institution.

## Approach

### Critical Reflection

The practice of critical reflection supports new ways of theorizing and managing as a system through a process of control and systemization. The process is informed through established theoretical knowledge and consideration of the existing situation and where it should be in order to apply rational standards. (Cunliffe 2004; Caproni and Arias 1997) In this fashion, one's own assumptions and experiences help to develop a more progressive and holistic way to consider organizational management since reflective practitioners are able to think beyond the day-to-day operations.

In practice, people often consider learning merely as 'problem solving' of external issues, rather than looking inward at their own behaviour and experiences. (Argyris 1991) Critical reflection analyzes connections and constructs of understanding of assumptions, which can lead to innovation in thinking and actions. (Schön 1983; Argyris 1982, 1991) By considering past occurrences and goals, practitioners are better equipped to deal with challenges and opportunities because they have reflected on themselves and the situation, ultimately creating theory within the practice of personal experience. (Cunliffe 2004) The reflection must be applied within concepts of practice to be transformative, not abstract. (Gray 2007; Marsick and Watkins 1990)

In terms of critical reflection, Argyris (1991) defines two types of learning: Single and double-loop. Single-loop learning responds to cues and tends not to question why things are or how they happened and double-loop learning goes farther by reflecting on why and how cues happen. Double-loop learning questions standard approaches by reflecting on how policies and procedures can be overhauled for the better, as opposed to just accepting them for what they are. (Argyris 1991) Given the goal of this paper is to generate a new way of thinking about and operating an organizational management system, the research follows a double-loop learning style. Double-loop learning places value in reflecting on the mutually beneficial role of theory and practice in developing and operating resilient management structures.

Accordingly, the research in this paper considers existing theoretical and professional literature in conjunction with the author's own experiences in professional management. Literature offers important insights to managing a triple bottom-line approach within an organization but does not operationalize a multi-sectoral process to get there. Firstly, the reflection examined literature and professional examples to determine where theoretical gaps exist for practitioners. The pieces of applicable contributions were then applied within the stages of the framework to create a robust and holistic process. Applying both

the theoretical and professional lens provides a more informed perspective of the elements affecting an organizational management system as well as the necessary insights to create foundations for the more progressive approach of triple bottom-line management.

## Professional Practice

It is an asset to have professional experience within a variety of industries when applying a theoretical approach such as material flow analysis to examine organizational material, energy, and information flows. With such practice (in institutional, manufacturing, nonprofit, and consulting), the author has gained insight into the structures and relationships that contribute to success or to failure within the workings of a management system. Specific areas of direct expertise include capital planning, design and construction, business and facilities operations, environmental health and safety, education (curriculum design and lecturing and outreach programming), community partnerships, and strategic planning and reporting. These roles require interaction with a variety of stakeholders, such as community members, students, faculty, volunteers, and employees. This work has been recognized widely, including international publications and regional awards.

Professional experience helps to substantiate sector similarities, differences, and unique challenges when it comes to organizational drivers (efficiency, compliance, and reputation). The drivers are central because they direct how strategy and operations are managed. With institutional and non-profit sectors, there are large amounts of reporting responsibilities both internally and externally, given that a significant amount of revenue comes from external funding. Considering the profile associated with public money spending, stakeholder buy-in is also

increasingly important. This should translate to highly regulated practices within procurement, and diversity, accessibility, and health and safety compliance.

In manufacturing, efficiency tends to rule in the management approach but compliance is also a significant driver, particularly in terms of quality control, which is influenced through third-party partnerships and health and safety regulations set out by government legislation. Unlike the procurement legislation that dictates money flow within the public sector, the manufacturing industry tends to have more specific government requirements for environment, health and safety, such as materials handling and disposal. External to government mandates and common voluntary third-party quality-related standards, some adopt environment and social responsibility standards, all of which influence organizational reputation.

In contracting or consulting, the organization must adapt to customer requirements, which will differ from sector to sector. It can be generally expected that efficiency and reputation are the key drivers as this sector in order to attract and maintain a client base through high-quality customer service. Contracting or consulting organizations in the knowledge-based sector must operate with very little overhead as they tend to provide billable services as opposed to material products.

All sectors feel varying degrees of pressure from each of the three key drivers of efficiency, compliance, and reputation at one time or another. Using the drivers as motivation to accomplish the organizational goals of an organization, the following framework becomes relatable to any user. The combination of theoretical work in industrial ecology and practical experience in sustainability management helps to create a feasible and comprehensive framework for practitioners. Consequently, the following approach contributes to the theory surrounding integration of sustainable management systems, developed through the sequence shown in Figure 2.
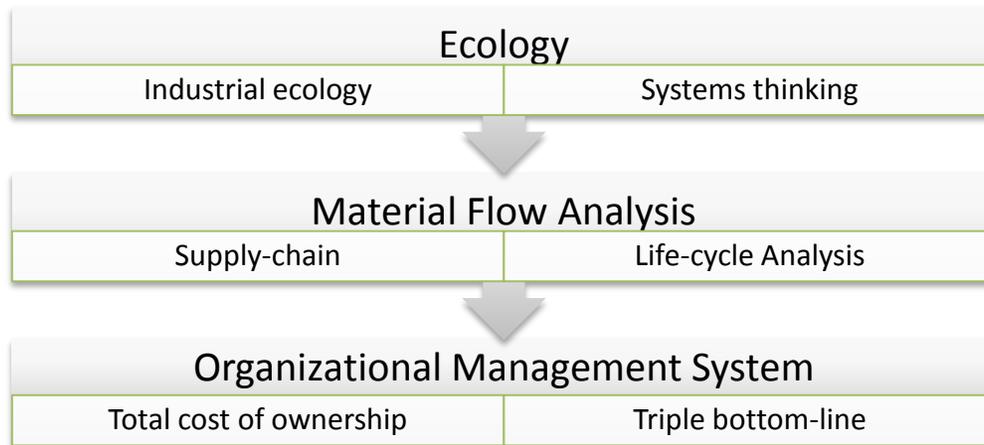
| Ecology | |
|---|---|
| Industrial ecology | Systems thinking |

| Material Flow Analysis | |
|---|---|
| Supply-chain | Life-cycle Analysis |

| Organizational Management System | |
|---|---|
| Total cost of ownership | Triple bottom-line |

Figure 2: The evolution and translation of academic theory to practice within triple bottom-line management

## Material Flow Analysis

Research in sustainable management is commonly linked to applications within the field of industrial ecology, specifically, material flow analysis. In this fashion, efficient workplaces minimize wastes by identifying organizational flows, from the purchase of materials and services to product use and disposal. This holistic picture provides improves the ability to capture wastes, respond to regulatory mandates, and provides stakeholder transparency. Like material flow analysis, the management system approach in this paper follows a preliminary stage of gathering and handling resources, a secondary stage of processing materials, and a final stage of material outputting, as seen in Figure 3.

| Inputs | Processing | Outputs |
|---|---|---|
| •Materials<br>•Energy<br>•Knowledge<br>•Capital<br>•Labour | •Refining<br>•Manufacturing<br>•Quality/R&D<br>•Policy | •Product/Services<br>•Wastes<br>•Exporting<br>•Reviews |

Figure 3: The process of material flows helps quantify what is exerted in the process of gathering, processing, and disposing of materials, energy, and information. (Barles 2010)

The preliminary stage of material and energy flows includes processes that bring together the raw resources available to an organization. Often 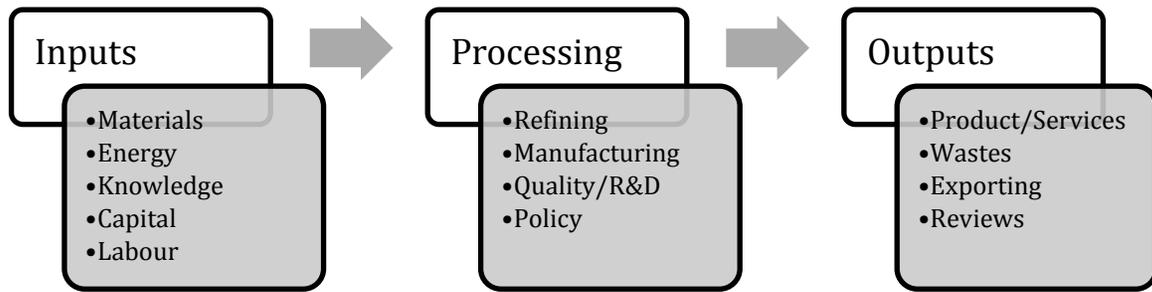the resources are in raw form, and when they are not the procurement process should capture extraction data from the supplier. Accordingly, this stage takes into account the way in which the resources were gathered; with a triple bottom-line approach, priority is given to materials produced by non-invasive extracting/mining techniques, and with energy, renewable or low-impact sources is prioritized. Effective administrative ways to manage this process are through procurement plans and related requirements.

In the processing stage, consideration is given to how materials move throughout the organization. Resources are directed by means of controls and structures of the administrative strategy, in the form of such things as design standards and work procedures. There are many internal and external priorities to consider in this stage, from quality control standards to hazardous materials handling protocols. Each organization will have its own goals based on the external and internal drivers it is subject to.

Outputs deal in the area of managing by-products, emissions, and delivery, with the goal of reducing wastes. Specific considerations may go to material sorting, inventorying, and reuse, repurposing and/or recycling, scheduling, emissions capturing, and transportation logistics. Some of these areas may be influenced by external mandates but much of the time it is up to the organization to regulate as they see fit. Like the input and processing stage, a triple bottom-line approach within the output stage is driven by increasing efficiency, ability to respond to mandates, and improving stakeholder image and relations. In this fashion, the complete picture of material, energy, and information flows through the organization can be analyzed.

## *Inventorying*

The first stage of developing a management framework is to determine the scope of the organization in terms of parameters, administration, and operations, as outlined in Figure 3. (Tahir and Darton 2006; Bossel 1999) These elements are the operating mechanisms within the management system that act as a guide for defining and organizing the capabilities of an organization. This process helps to clarify and focus the process of gathering the day-to-day inputs and outputs that will be under investigation. (Tahir and Darton 2010; Church and Rogers 2006; Holdsworth 2003; Bell and Morse, 2008; Shriberg 2002; Fresno and Kroonenberg 1992) Ultimately, the assessment stage is necessary to determine where the system is succeeding and where potential adjustments are needed. (Azapagic 2003; Clayton and Radcliffe 1996)

The spatial scale is the physical size of the system and its elements and includes characteristics that can impact the business in terms of capacity and geography. The temporal scale is the period over which the impacts of business operations are considered, which must be able to sufficiently adapt to emerging as well as existing trends, for example, a five-year management plan, often including short, medium, or longer-term goals with related milestones. (Tahir and Darton 2010; Bell and Morse 2008; Shriberg 2002; Bossel 1999; Fresno and Kroonenberg, 1992) Demography includes the trends that drive business in terms of stakeholder base, as well as changes to the economy driven by the contemporary and future environment. More specifically, it includes information on employees in terms of employment type, qualifications, incentives, and other profile information.

Baselining spatial, temporal and demographic values provide an understanding of internal and external capabilities and audiences. Accordingly, this information links business administration to overall mission and goals. In doing so, the scope analysis must make sure to include the necessary features of the business, but not be drawn so widely that inessential activities that could confuse subsequent analysis are included. (Tahir and Darton 2010; Bell and Morse, 2008; Shriberg 2002; Bossel 1999; Fresno and Kroonenberg 1992)

The mission of a business is an overarching directive that is marketed widely, both internally and externally. When an organization thinks about its mission, it analyzes the role of its customer base, its history, and where it would like to go. (Walton and Galea 2005)  For example, a post-graduate educational institution would include goals of excellence in learning and advancing knowledge and a manufacturing company would likely include goals surrounding quality control and customer service. Missions are generally supplemented with more specific values and guiding principles, which allow a business to highlight important organizational objectives. Businesses often include 'vision' statements, which highlight the potential of the organization. Further, guiding principles are meant to direct an organization irrespective of strategic changes; they generally revolve around areas of service, cost control, responsible governance, community citizenship, health and safety, and the like.

The organization's overall goals are what frame the core operations of business. (Walton and Galea 2005) While some activities are central to the goals of the organization, others will be considered supporting activities. For a marketing company, the core activities would include communications, advertising, and research; for a manufacturer, it would be quality control, customer service, distribution, marketing and production labour. Most sectors have similar support activities, such as purchasing, facilities, management, customer service, and waste management. (Walton and Galea 2005)

The analysis should be performed at the strategic and operational level of an organization to ensure alignment. Strategic level analysis compares existing administrative performance against desired and operational analysis examines the functions that produce products and services. The purpose of the analysis is to create an inventory of activities that relate to the business plan. (Tahir and Darton 2010) Once identified as significant, they can be are categorized and associated with measurable indicators. The concept behind the analysis is to make sure an organization is making the best use of resources and thus performing at an optimal level.

In addition to assessing the organization, this is the stage where industry benchmarking takes place. Understanding the general performance in the industry makes it possible to compare logical expectations with the company's current level of performance. The best place to start is with the corresponding sector; however, a cross-sector evaluation can help stimulate innovation.

Gap Analysis

*Strategic Administration*

The success of triple bottom-line management depends largely on its strategic handling. Strategic business practices help respond to driving forces in industry by directing how inputs and outputs are governed. (Pojasek 2009; Holdsworth 2003; Huber 2000; Kirkland and Thompson 1999) This is done through things such as policies, design standards, work procedures, and master plans. (Bertels et al. 2010; Azapagic 2003; Holdsworth 2003) Principles of triple bottom-line fit very easily into the strategic principles of an organization because they help relate resources back to deliverables. (Tahir and Darton 2010; Huber 2000) Once the organization understands its strategy, the next step is to identify the central inputs and outputs and supporting functions necessary to achieve the overall mission.

*Operations*

Once the organization identifies the goals and administrative tools available to manage resources, it is time to capture the key business inputs and outputs. Inputs and outputs form the operational system, which consists of core activities and supporting functions that turn out the final product or service. Constructing a model of the existing system helps to identify gaps and

weaknesses in the forward and backward flow of information and communication. (Tahir and Darton 2010; Tahir and Darton 2006; Holdsworth 2003) This is not to say business strategy cannot be influenced from the bottom up. The successes and weaknesses at the operational level must inform business strategy or else the strategy risks irrelevancy. A continual process of review will pick up on trends that drive integrated change in the management system and will help keep existing administrative strategy current.

The material flow analysis approach to identifying inputs and outputs is the most relevant to a triple bottom-line approach because it captures the process of review from the very beginning, before anything enters the building, until the very end, how disposal and dissemination occurs. The business inputs and outputs include materials and energy and the information that flows through the organization. Materials and energy are the physical resources and energy used in operations and information makes up the communication channels in the business process. (Tahir and Darton 2010)

Inputs and outputs operate with the help of subsystems, which transmit information to and from system elements. Subsystems do not operate in isolation, but have the capability to influence the overall effectiveness of operations by tying together core activities through the supporting channels that link the management system, such as office management and printing services (assuming this is not the primary function of the business). It is common for a given support system to contribute to many different functions. (Clayton and Radcliffe 1996) Though subsystems are integral to the overall operation, the analysis focuses on the core system elements that are central to the nature and mission of an organization rather than support activities. (Walton and Galea 2005)

So far in the framework, the steps have started the processes of constructing a model of a management system that aims to identify gaps in the flow of materials, energy, and information.

(Holdsworth 2003) Once the gap analysis of the inputs and outputs is complete, the next step is to establish the relationship between all flows, through the development of indicators.

## Indicators

Like other corporate performance metrics, sustainable development indicators provide the means to target, measure, and report on progress. Not only do they measure the performance year, they also enable organizations to establish baseline information, which is necessary for monitoring, evaluating, and reporting on programs and overall operations into the future. (Singh et al. 2009; Azapagic 2004; Warhurst 2002) To do this, the organization must perform a thorough assessment to understand key areas of strength and weakness. (Azapagic and Perdan 2000)

To develop indicators, the organization must follow a series of steps. First, the organization must select the key areas the organization would like to emphasize and focus on. The next step is to group and normalize the items based on relevancy to help simplify and organize the process. Once complete, the key areas must assign a value and associated metric, which will signal the consequence to the organizational mission. (Krajnc and Glavič 2005 a, b) Quantitative indicators use a calculable metric, such as a change in physical size of a building. Qualitative indicators also have a numeric metric attached to them, such as percentage growth of a program, because they are geared to measure the change of judgment or perception discovered through such things as surveys and questionnaires. (Church and Rogers 2006; Meadows 1998)

For indicators to play an effective role there must be a clear association between the inputs that the indicators are measuring and the outputs that are desired. (Azapagic and Perdan 2000) An in-depth understanding of the organization will serve the indicator development process well. Considering the assessment process, the next step is to summarize the items that have been chosen as having significant consequences to business processes in terms of continual improvement and process control. (Holdsworth 2003; Azapagic and Perdan 2000; Bossel 1999) At the same time, the organization will decide whether the indicator acts to maintain similar performance or prescribes change.

Transitioning business operations to a more formal approach of managing business requires organizations to set clear goals and objectives. (Holdsworth 2003) Goals can be at the organization, department or individual level and arise from particular values, which in turn help to create new values in the business. (Hoffman and Henn 2008; Meadows 1998) With thought to triple bottom-line management, the goals will be more successful if they fit the nature of the company. (Hoffman and Henn 2008) To achieve suitability, the material flow approach helps to ensure indicators to be traceable to a particular business process in order to determine the impact and association of the inputs and outputs. (Tahir and Darton 2010; Azapagic and Perdan 2000)

*Actions*

Action items accompany goals by providing operational information on how the organization must work to achieve overall goals. Actions are made up of information from day-to-day business operations that have particular influence on the overall mandate of the organization. Once the goals and associated action items are developed, the organization is able to define the indicators that will help manage triple bottom-line principles within the management plan. (Walsh et al. 2006)

The actions should be easily understandable and limited in number so as not to become overly onerous or unrealistic as a business tool, considering the extensive reporting requirements that are already required. (Spangenberg 2002) Additionally, attaching milestones will provide reference during the process of implementing change to help create a plan of action. Further, this helps determine the overall reporting structure that is used by the organization. (Bertels et al. 2010)

*Measurement*

The indicator must include information on the scope of measure, which includes the full scale of information that that the indicator covers in order to inform the next step, which is attaching a unit of measure. Indicators should be based on existing data or data that is relatively simply to gather and analyze. (Krajnc and Glavič 2005a; Bossel 2003, 1999; Spangenberg 2002) With this information, businesses should identify the range of information by organizing indicators by common characteristics or activities. Ultimately, this is a process of aggregation. Consideration

should also go to an indicator's ability to withstand minor changes in business operations, changes to available data, or the approach for using the indicators. (Krajnc and Glavič 2005a; Spangenberg 2002)

The next step studies the object of assessment and its impact in order to assign a value rating, which reflect the prime purposes of the organization. At this stage, the organization pinpoints the indicators that have a positive impact in increasing efficiency, compliance, and reputation, as well as those with less impact or a negative impact. (Singh et al. 2009; Krajnc and Glavič 2005a; Spangenberg 2002; Allenby 2000; Reinhardt 2000) Next, the organization must attach a weight to represent the value. Weight represents the importance of the indicator in terms of its value to the organization, as opposed to a metric that will quantify process. (Azapagic 2004) In terms of selection, scope, and significance, the process of choosing a weight must be transparent to be widely understood. (Spangenberg 2002)

Triple bottom-line principles are particularly important to consider within the value setting process, in order to help set direction. Financial capital will revolve around the state of economic success in terms of efficiencies, outputs, and reporting practices. Natural capital includes the impacts that business operations have on ecosystems, such as living and nonliving systems, land, air and water. Human capital assessment gauge the attitude of the company toward its stakeholders, including employees, suppliers, contractors, customer, and the community. (Azapagic 2003; Azapagic and Perdan 2000)

Finally, the organization must attach specific metrics to the indicators in order to measure performance. Indicators and metrics go hand in hand; they are necessary to quantify actions and provide information on progress. (Singh at al. 2009; Azapagic 2004) Indicators must not only be objective, they must also be easy to measure in terms of calculation and access to information. (Azapagic and Perdan 2000) The process of attaching a metric is informed through comprehensive

baseline and priority ranking information. Once the organization determines its baseline

information and ranking hierarchy, the next step is to attach a metric. Without a reference value

attached, indicators are unable to provide assessable information on sustainable operations.

The goal of these steps is to establish a management system where performance can be

measured against documented practice via indicators. Indicators allow an organization to measure

the performance of future actions, through means of verification. Measurement and verification is

vital within any management system but particularly so for triple bottom-line management to

demonstrate savings associated with energy, materials, and even bahavioural changes.

*Verifying*

Finally, the administration of a business must have an integrated way of tracking its

operations to get accurate, up to date information, which directly improves efficiency levels,

information for reporting and stakeholder relations.  Verification tools monitor the inputs and

outputs of the management system and include such things as metering, building automation

systems, human resources information systems, energy management systems, and procurement,

financial and capital planning systems.

Reporting methods will use information from the verification systems to scan for

opportunities and threats and provide transparency to stakeholders. (Doppelt 2008; Hoffman and

Henn 2008; Blackburn 2007; Anderson and Bateman 2000) Scanning includes an analysis of both

internal and external influencers to keep up to date on industry best practices. (Bertels et al. 2010;

Blackburn 2007)  Measurement and verification tools must be exhaustive and versatile; ultimately

they must be able to provide trending, forecasting, summarizing, and detailed reporting

capabilities. Board level stakeholders may just need high-level information represented in a

summary or forecast, and middle management, such as production managers, will want detailed

schematics on day-to-day operations, within one or several departments. (Huber 2000)

## Application

An early stage application of this method is seen in Laurier's Sustainability Action Plan.

(Wilfrid Laurier University 2012) Wilfrid Laurier University is a medium sized comprehensive

university in Waterloo Ontario, located in an urban setting. Laurier has had a Sustainability Policy

since 2009 and a Sustainability Office since 2010; additionally, the university has a progressive

energy management plan (2009), which includes an associated behavioural plan and campus

master plan, both of which focus to a large degree on sustainability. Further, the university's vision

and guiding principles include sustainability principles.

Laurier's Sustainability Action Plan provides a set of goals and related action items to achieve

over a 5-year period, which are evaluated through milestones and related indicators and metrics.

The overall goal of the plan is to reduce greenhouse gas emissions by 15% over the life of the plan.

The plan was based on a detailed assessment process, which included AASHE STARS as well as an

inventory of existing plans, programs and mandates of the University. (Laurier Sustainability Action

Plan 2012, pg. 8, 22) From this, indicators were developed for each section of the plan: Operations,

Education, and Community Partnerships. (Laurier Sustainability Action Plan 2012) Laurier's annual

reports are based on the goals, structure, and progress of this plan, which are monitored via

systems such as dashboards, management and information systems, surveys, and other program

statistics.

# Chapter 5: Triple Bottom-line Management System

# Framework

The process of embedding and maintaining a triple bottom-line management system follows a natural progression of data gathering, goal setting, and review. Broadly, the framework includes three main stages in creating a management system: (1) Assessing the organization, (2) Associating indicators to the assessment outcomes, and (3) Measuring and verifying the management system. During the assessment stage, organizations will uncover the scope of business as well as the strategic and operational elements that take place. Material flow analysis informs this process through an investigation of key inputs and outputs through the entire life cycle of business operations. This information then guides the direction and measurement of the management system. Then, the organization can develop applicable indicators to measure from, review with, and report on. The outline of the overall framework is represented in Table 1 to provide guidance; a more detailed description of each stage will follow.

Table 1: Summary of the framework for implementing a triple bottom-line management system in an organization

| STAGE | STEPS | FACTORS |
|---|---|---|
| ASSESSMENT | Organizational Boundaries | Temporal<br>Spatial<br>Demography |
| | Strategic | Mission<br>Guiding principles<br>Policies, procedures, & programs<br>Regulations<br>Communication networks |
| | Operational | Inputs<br>Processing<br>Outputs |
| | Communication Networks | Informal<br>Formal |
| INDICATORS | Topic of Measure | Goal<br>Action |
| | Scope of Measure | Range<br>Value |
| | Unit of Measure | Baseline<br>Weight<br>Metric<br>Verification |
| VALIDATION | Measurement | Document access, control, databases, automation, metering |
| | Reporting | Annual, monthly, internal, external, metrics |

Step 1 - Boundaries of the organization: Scope analysis

Before an assessment of the business strategy and operations can take place, the organization must define its scope. The organizational boundaries are defined by baselining the structure of the existing business. All organizations operate differently, particularly from sector to sector, however, the boundaries will help guide the initial identification process that directs the thorough assessment that follows.

The boundaries and strategy of a management system, as represented in Table 2, shows how the strategic elements of an organization comprise temporal, spatial, demographic, and administrative functions. It is important for an organization to define the scope because this will guide operations and behaviour, which contributes to distinct values.

Table 2: Management System Summary - Boundaries

| TEMPORAL | Time period | Span of planning |
|---|---|---|
| | | • Length of master/management plan, periods of review, allotted time for jobs, free time, etc. |
| SPATIAL | Scale | Capacity of space and people |
| | | • Number and of buildings and employees, square footage, etc. |
| | | Functions of space and people |
| | | • Department organization, roles, adaptability, etc. |
| | | Structure & scope |
| | | • Life-cycle, organizational structure |
| DEMOGRAPHY | Current | Employee, customer, and investor base, targeted base, community |
| | | Economics and social climate |
| | Trends | Retiring baby boomers, increase in younger population |
| | | Climate change/ adaptation, CSR, triple bottom-line |

The scope of an organization can be defined using the following guiding elements:

## Temporal

Temporal elements are the timeframes that help define the workings of an organization.

*Span of a management plan* – life span given to a major guiding management document or sub-documents, such as a master plan (physical growth), academic plan, transportation management plan, waste management plan, quality control plan, etc.

*Work and free time* – amount of time designated for in and out of office work hours as well as breaks, lunches, and social events

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## Spatial

Spatial elements are the physical size of the system and its elements.

*Capacity of space and people* – expected or planned growth of an organization and what that means to physical size, such as space planning and employment levels

*Function of space and people* – planned use and growth of physical space and employee roles

*Organizational structure and scope* – planned size, hierarchy, and responsibility of departments, roles, and relationships

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## Demography

Demographic elements include the existing and future drivers affecting business.

*Internal stakeholders* – members of the organization that directly contribute to its operational function, such as employees, managers, board, and committee members

*External stakeholders* – members who affect the state of an organization, such as auditors, customers, government and partners, and media

*Trends* – past, current, and future drivers affecting the market, such as age, gender, economic

standing, geographic location, and marital status

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Once the scope of an organization is documented and understood, the organization can analyze the administrative mechanisms that direct daily operations. The strategic level analysis identifies where existing management fall short in terms of potential structural performance by comparing expectations with current level of performance. The elements identified at the strategic stage, as represented in Table 2 and 3 are the mechanisms by which the subsequent operational elements will operate.

The organizational strategy of a business is an overarching directive that is set by a clear mission. Business strategies consider the mission while analyzing the role of its customer base, its history, and where it would like to go. Missions are often supplemented with more specific values and guiding principles to highlight important organizational objectives. Guiding principles are meant to direct an organization irrespective of strategic changes and tend to revolve around areas of service, cost control, responsible governance, community citizenship, health and safety, etc.

As Table 3 outlines, the organization must first identify administrative controls that promote the mission and guiding principles. These controls include the policies, plans, procedures, regulations, and measurement tools by which the organization operates. The next step is to analyze where there are strengths and opportunities.

Table 3: Management System Summary - Strategic

| ADMINISTRATION | Mission | Way in which an org provides products, services, education or administration:<br>• Quality/quantity<br>• Sustainability and/or CSR<br>• Customer service |
|---|---|---|
| | Guiding principles | Areas of emphasis to the mission that become the philosophy of the organization |
| | Policies, procedures & programs | Up-to-date, accessible standardized in areas of quality, environmental health & safety, accessibility, customer service, purchasing, production, etc. that link strategy to operations |
| | Regulations | Stakeholders: Internal, partnerships, investors, board members<br>Regulatory: by-laws, codes, legislation, audits, rankings |
| | Communication networks | Information systems, spreadsheets, web pages, surveys, etc. |

The core mission of an organization drives the strategic systems, which generally fall in the following categories:

| Tangible Products | Manufacturing |
|---|---|
| | Distribution |
| | Resale |

| Intangible Products | Virutal goods |
| --- | --- |
| | Insurance |
| | Services: Administration, consulting, education, etc. |

Strategic considerations of an organization are very much consistent across sectors. The mission statement succinctly captures the overall direction and objective of the organization. Each organization, even those in the same sector, then differentiate themselves though the decree of guiding principles and goals that supplement the organizational mission. Guiding principles are the ideals that an organization seeks to embody in all its operations, for example:

| Costumer Service | Focus on the needs and service of customers |
| --- | --- |

| Continuous Improvement | Pursue ideas, creative approaches, improvements |
| --- | --- |

| Social Responsibility | Follow ethical and inclusive practices |
| --- | --- |

For the majority of organizations (whose mission is not solely to deliver a sustainable product or service), mention of triple bottom-line approach would be included in the guiding principles section. Ideally, the organization will reference the guiding principles throughout the strategic planning process and eventually into operations. To do this, the organizational policies,

procedures and programs must translate the strategic message into clear operational guides and processes, which assume some of the following forms.

| Policies | General, overarching statements of an organizations committment |
| --- | --- |
| Master & action plans | Organizational-wide, longer-term plans that are comprehensive and multifaceted in nature |
| Design standards | Organizational-wide standards for products and protocols to follow during capital planning and facility operations |
| Work procedures | Guidelines, often step-by-step, that outline the process of a work station or task, ie. quality control process, manufacturing line |

Policies and procedures can be considered tools for organizations to achieve goals but it does not stop there. As the saying goes, you cannot manage what you do not measure.  Once an organization fully identifies the elements of its strategic system, data monitoring tools must be available to track, model, and report the information. Tools include resources such as spreadsheets, logs, automation systems, metering, and management databases.

Another key administrative consideration is the regulatory obligations of an organization, which can be in the form of laws or voluntary relationships. Organizations all experience similar external regulations, in terms of reporting, codes, and by-law compliance, though some may have additional obligations based on the sector and governing body. For example, public sector institutions must follow specific procurement procedures, which are documented and subject to

audits. On the other hand, voluntary regulations are adopted by organizations to hold themselves accountable to particular standards. In either scenario, organizations must demonstrate compliance, both to internal and external regulations. Work procedures will help ensure protocol is followed and the administrative tools will track the necessary information.

Accordingly, the workings of an organization's administrative system will impact the ability to be efficient, respond to regulations, and be transparent. The day-to-day operation of an organization is complex in that there are many layers and components that should be continuously working together. In order to have well-informed administrative systems, organizations must spend time gathering a comprehensive picture of operations.

Considerations for completing a Strategic Gap Analysis for a Triple Bottom-Line Management System

Clarify

➢ A clear definition of the administrative goals are necessary to develop ensuing indicators (Singh et al. 2009)

Codify

➢ When examining existing administrative controls for improvements, look to informal aspect of the organization that add key inputs that could be developed into goals, principles, policies, standards, etc. and ultimately procedures (Bertels et al. 2010)

Consume

> Ensure there is sufficient documentation to confront regulatory and corporate regulations (Holdsworth 2003)

Customer Service

> Make use of existing policies and processes to leverage or build on goals, such as environmental, health and safety policies, Total Quality Management, environmental management, or lean manufacturing (Bertels et al. 2010; Willard 2012)

Finally, the administration of a business identifies the ways it can track its operations, which includes such things as metering, building automation systems, human resources information systems, energy management systems, and procurement, and financial and capital planning systems. Measurement tools must be exhaustive and versatile; ultimately they must be able to provide trending, forecasting, summarizing, and detailed reporting capabilities.

Table 4 outlines key operations of a business, which include inputs, how they are processed, and the associated outputs. The successes and weaknesses at the operational level must inform business strategy or else the strategy risks irrelevancy. The business inputs and outputs include materials and energy (physical) and the information (expertise and channels) that flows through the organization.

Inputs and outputs operate with the help of subsystems, which transmit information to and from system elements. In this stage, focus is on the core system elements that are central to the nature and mission of an organization rather than support activities. Table 4 provides a guide to identify the actors that influence what goes into and out of the management system; for example, employees, mandates and training are inputs whereas customers and waste are outputs.  Once the gap analysis of the inputs and outputs is complete, the next step is to establish the relationship between all flows.

Table 4: Management System Summary - Operations

| OPERATIONS | Inputs | Investment:<br>• Capital<br>• Facility, including utilities<br>Resources:<br>• Manpower, contracting<br>• Materials<br>• Utilities<br>• Technology<br>• Information (benchmarking, research, etc.) |
| --- | --- | --- |
| | Processing | Procedures<br>Equipment<br>Meetings/schedules/budgets & forecasting<br>Systems<br>Development<br>Professional development, training<br>Maintenance & inspection<br>Customer Service, internal communication |
| | Outputs | Waste handling<br>Transportation<br>Scheduling<br>Services<br>Goods<br>Review process: audits, professional, indicators, reporting, etc. |

Inputs, processes, and outputs are made up of materials, energy and information that flow through the organization. Materials include the tangible items necessary for administrative functions, such as computers and paper, and production, such as bolts and screw drivers. Raw materials can be in the form of textiles, electronics, concrete, metals, plastics, wood, and ceramics. Energy is comprised of intangible resources necessary to power facilities and systems, such as electricity, natural gas, and fuel. There are three scopes of energy, the first is direct energy from business owned or controlled sources, the second is indirect which is purchased energy used on site and the third is indirect (other), which are not included in scope two but take place up or down stream, such as water. Finally, information is made up of human driven transfers that promote interactions and strengthen transparency. Examples include intranets, meetings, and professional development. (Barles 2010; Brunner and Rechberger 2004; Anderberg 1998)

With the inventory of strategic and operational elements at hand, the organizations must identify the communication channels that help keep organizational process on track. Following organizational strategy may sound obvious, but it is easy to stray off topic and risk ambiguity. The communication channels form a network that links and communicates the administrative and operational elements within the organization in a way that reflects organizational goals.

During this stage, the organization will identify the channels for the flows to operate, such as automated systems, regular meetings, and intranets. Organizational networks are generally comprised of informal and formal processes. Informal processes are beneficial because they general arise organically out of the culture of an organization and so work effectively within a given organization. However, without formalization, informal channels risk subjectivity in terms of how they are operated.  Alternatively, formal channels are systematically embedded within the organization, occurring on a regular basis and in a defined way. Examples of informal and formal communication networks are included in Table 5.

Table 5: Informal and formal channels that form a communication network within an organization

| COMMUNICATION CHANNELS | Informal | Emails, social media, phone calls<br>Periodic meetings, site visits, conversations, work or employee reviews |
|---|---|---|
| | Formal | Daily, monthly, etc. health and safety/other checklists<br>Daily/weekly meetings, yearly audits<br>Intranets, monthly newsletters |

A mixture of both informal and formal channels is beneficial for a strong communication network within an organization. Informal channels help promote awareness in an organization and formal channels are the 'go to' sources for information on organizational flows. The communication network of an organization plays an important part in directing and communicating resource flows so must be referenced within the initial assessment process to be considered during the overall indicator development process in Stage 2 of the framework.

## Stage 2: Associate indicators to the assessment outcomes

Considering the assessment process in Stage 1, the next step is to summarize the items of significance in terms of continual improvement and process control of a triple bottom-line management system, as outlined in Table 6. At the same time, the organization will decide whether the indicator acts to maintain similar performance or prescribes change.

The first step identifies what should be measured in the organization based on what is valued in terms of maintenance or alteration; the second step formulates the scope of the indicators to provide a comprehensive picture of organizational goals. The next step is to allocate a dimension so all parties understand the scope of the intended change. This includes identifying and analyzing baseline year information in order to assess the state of the performance year.

Table 6: The core steps to follow to create organizational indicators include defining the topic, scope, and unit of measure

| **INDICATORS** | Topic of Measure | Goal<br><br>• Overall objectives based on assessment strengths and weaknesses<br><br>Action<br><br>• Operational information to achieve goals |
|---|---|---|
| | Scope of Measure | Range<br><br>• Organize by common characteristics or activities<br><br>Value<br><br>• Assign a weight based on the organizational mission to create hierarchy within:<br><br>    ○ Financial & built capital<br>    ○ Natural capital<br>    ○ Human capital |
| | Unit of Measure | Baseline<br><br>• Information to measure progress against<br><br>Metric<br><br>• Numeric way of measuring progress<br><br>Verification<br><br>• Scan internally and externally |

Indicators summarize and focus actions into manageable amounts of information that has a high degree of influence on business performance. In most cases, the indicator themes will relate closely to the strategic level items identified in the assessment stage.

*Goal*

Goals arise from values and can be at the organization, department or individual level. The assessment stage will discern whether there are organizational gaps and new goals should be developed. Using the assessment as a guide, the goals frame the specific areas or items being measured. The goals are the overall topic areas and include such categories as business operations, facility operations, and customer service. Each goal will have associated items that are geared to specific actions, which are more specific, such as those related to product testing or social marketing.

*Action Item*

Action items provide operational information on how the organization must work to achieve

overall goals. Actions are taken from of the day-to-day business operations that impact the overall

mandate of the organization, as represented in Table 7. Once the goals and associated action items

are developed, the organization is able to define the indicators that will help manage triple bottom-

line principles within the management plan. (Walsh et al. 2006)

The actions should be easily understandable and limited in number so not to become overly

onerous or unrealistic as a business tool, considering the extensive reporting requirements that are

already required (Spangenberg 2002). Additionally, attaching milestones to reference during the

process of implementing change will provide a plan of action as well as a reporting structure

(Bertels et al. 2010).

Table 7: An example of the hierarchy of goal setting within a triple bottom-line management planning process

| Topic Area | Goal Area | Action Areas |
|---|---|---|
| Business Operations | Admin & Finance | Social accounting, integrated reporting, socially responsible investing, alternative funding models: SEED, revolving, incentives, partnerships |
| | Procurement | Fair trade, local & inclusive sourcing, limited packaging |
| | Human Resources | Corporate social responsibility: Diversity & accessibility resources, professional development, telecommuting, time of for volunteering |
| Facilities Operations | Production | Material reuse and recycling |
| | Maintenance | Maintenance schedule, efficient fixture standards, automation systems |
| | Custodial | Green cleaning program (eliminate chemicals); waste management – diversion programs |
| | Grounds | Native species use, stormwater management, walkable & bikable areas |
| | Health & Safety | Hazardous waste management, certification |
| | Quality Assurance | Environmental standards, calibration & recalibration, R&D, continuous improvement |
| | Shipping & Receiving | Packaging restrictions, fleet, route, and material management |

## Step 2 – Scope of Measure

The scope includes the range of information being considered as well as the value of this information. This step is important to frame the indicators and also begin the process of determining the impact each indicator will have in guiding process.

### *Range*

Using the available data, businesses should organize indicators by common characteristics or activities, while still clearly representing the phenomenon in question. Consequently, the key topic of the indicators must have individual characteristics; otherwise there will be redundancies that are inefficient to a business's operations. Ultimately, this is a process of aggregation.

However, in order to be widely applicable, the indicators must be generic so to not become dependent on specific context; otherwise they may become limited to certain time frames or business units. Each action item does not need its own measurement indicator; ideally, the indicator should be broad enough to deal with several (or even all of) the actions within a goal, while still outlining specific outputs. Commonality makes the process easier to adapt and manage. Ultimately, indicators must be succinct to be a viable business tool while remaining hardy enough to operate without discrimination or becoming irrelevant within a short period of time.

*Value*

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Value is based on a business's mission and provides a means to understand business operations as a whole by laying out the value hierarchy. With triple bottom-line, the value scheme should capture the economic, environmental, and social impacts that are implicit in operations.

Weight

With information on the baseline year as well as performance year, indicators will have the necessary information to attach a weight. Weighing can be tailored to each organization's processes so can take many forms, examples includes numeric ranking, visual ranking (using colours or images), or they can simply be labeled from low to high priority. Simply, the organization can make comparisons by asking which of the two indicators are more important to overall goals.

During this stage, the organization must consider the three-pillared value scheme of triple bottom-line management when analyzing resource flows. This weighing process will encourage application based on organizational values, rather than something prescriptive that may not fit overall mission and goals. Resource flows include the materials, energy, and informational inputs, processes, and outputs, which within the triple bottom-line approach, include:

### Financial and Built (Economic) Capital

#### Inputs

In organizations, economic capital inputs involve the management of supply-chains, risk and other governance, and resource productivity. (Reinhardt 2000) More specifically, this includes administrative and production materials, human resources, utilities and services as well as money flow from capital providers, customers, ancillaries, and agencies. (Khalili 2011; Tahir and Darton 2010) Considering these flows, and the drivers, the business will consider such things as ethical investing and procurement, integrated reporting, cost of non-compliance, i.e., environmental health and safety, continuous improvement, and turnover. (Tahir and Darton 2010; Azapagic 2003; Azapagic and Perdan 2000)

#### Outputs

Economic outputs include the by-products of doing business. With economic capital, these by-products include outputs that are not the principal product of the business, and generally have low value. Unnecessary wastes directly influence cash flows through excess product and efficiency levels. Major outputs include flows of money to employees for salaries, to suppliers and contractors for products and services, to capital providers for dividends or interest, and to external agencies for taxes and fees. (Tahir and Darton 2010; Azapagic and Perdan 2000)

### Environmental (Natural) Capital

#### Inputs

With environmental capital inputs, consideration goes to the impact that business operations

can have on ecosystems. Inputs include land access and management, emissions, biodiversity, water management, and environmental standing of suppliers and other stakeholders. (Khalili 2011; Tahir and Darton 2010; Azapagic 2003; Azapagic and Perdan 2000) Specific considerations should go to product durability, recyclability, and other life-cycle considerations, standing of suppliers, and workplace procedures.

*Outputs*

Environmental capital outputs include waste and other environmental impacts that emit carbon into the atmosphere. Specifically, major outputs include wastes (solid, liquid and atmospheric) and damage to land and biodiversity. (Tahir and Darton 2010; Azapagic 2003; Azapagic and Perdan 2000) Particular output concerns include carbon intensity, conservation management in terms of material and energy intensity, and pollution and damage to ecosystems. In addition to waste of resources, environmental capital outputs have the ability to levy fines for infractions as well as negative attention from stakeholders. (Reinhardt 2000)

Social (Human) Capital

*Inputs*

In an organization, inputs from social capital contribute to the collective well-being of the constituents. (Tahir and Darton 2010)  Specifically, inputs include policies that promote diversity and equality, socially responsibility, and community partnerships. Considering these flows, and the drivers, the business will consider such things as ethical investing and procurement, stakeholder inclusion, employee training, philanthropy, and diversity and equity programming. (Tahir and Darton 2010; Azapagic 2003; Azapagic and Perdan 2000)

Social capital outputs have the ability to strengthen workplace morale, which leads to better retention and attraction of stakeholders. In organizations, outputs stem from stakeholder satisfaction related to fair pay, training programs, volunteering, and professional development opportunities. (Tahir and Darton 2010; Azapagic and Perdan 2000) Social capital values society by investing in human stakeholders to get a return on investment through attraction, motivation, and retention.

## Step 3 – Unit of Measure

Metrics are necessary to quantify actions and provide information on progress. To do this, the organization must be able to measure both the performance year, and baseline year. The goal of attaching a metric must be to make the indicator easy to measure in terms of calculation and access to information.

### Baseline

Indicators determine progress in a particular area, as set out by the organization. To do this, indicators require baseline information to measure progress against. At a minimum, baseline information includes the output of materials, energy, and information over a given period of time, usually a full year. For a more comprehensive baseline, several years may be averaged in order to respond to variables such as weather patterns or increased commodity prices. Baseline information is determined through similar methods to an assessment: audit reports, utility tracking via spreadsheets and energy management and building automation systems, and other data that can be found via databases as well as manual compilation. Baseline information will be both qualitative and quantitative.

*Metric*

The process of attaching a metric is informed through comprehensive baseline and priority ranking information. Once the organization determines its baseline information and ranking hierarchy, the next step is to attach a metric. Though indicators should be quantitative whenever possible, qualitative descriptions are at times more appropriate for some aspects of triple bottom-line, particularly concerning social capital.

With quantitative indicators, the metric will take into account baseline information, trends, and goals. Baseline information provides the reference point while trending information allows the organization to see average progress; the goals influence how aggressive or conservative an organization is with targets. For example, if an organization chooses 2010 as a baseline year for electricity consumption and finds that the average progress of consumption has been a 1% a year reduction, then a conservative target would be to reduce electricity consumption by a total of 7.5% over the next 5 years, at 1.5% reduction each year.

*Verifiability*

Verifiable indicators must be reproducible so they can be used to create a robust inventory of performance measurements from parts or the whole of operations. The level of verifiability will determine the quality of ongoing benchmarking, baselining, and audit results. Additionally, well-formed indicators also substantiate the management system or elements of it during times of

resource planning, either internally or externally.

Indicators must be designed so the organization can use them to continually monitor trends that require integrated change in the management system.  Therefore, the indicators must be able to gather information from external drives, in addition to internal functions. To do this, the organization must draw from reliable and up-to-date sources of information, which can be found through industry groups and associations. Further considerations will go to industry type, size, and geographical location, which was identifies in Stage 1's assessment process. Further, the information must be easily understood so the verification process is straightforward, as demonstrated in Step 2: Scope of Measure in Stage 2 of the framework. Given the importance of being able to verify information, Stage 3 in the framework provides direction for creation a verification program in an organization.

## Continuous Improvement

The organization will use information found during the verification stage for continuous improvement as well as reporting, as summarized in Table 8. Continuous improvement can only take place if the organization can measure the state of business. Measurement controls vary in scope, with some businesses using less formal spreadsheet tracking, while others have detailed sub-metering and central information systems. The latter tends to provide a structure of regular information flow through automated feedback systems to monitor performance. To help verify this information and create a robust picture, organization can gather qualitative feedback to further through such things as surveys and stakeholder meetings. Table 9 represents the potential ways in which organizations will gather information on their key functions.

Therefore, rather than continually performing major assessments, the organization can use automated and qualitative outlets to monitor performance. This process will help ensure compliance to external audits as well as any assessment the organization undergoes, voluntarily or otherwise. Ultimately, the verification process ensures that the major elements of the organization, as represented in the indicators, are contextually relevant to business. Verification is an ongoing process throughout the organization whereas a major assessment would likely take place when updating or initiating a new plan.

Table 8: Strategic System Summary – Verification

| VERIFICATION | Measurement Tools | Meters, automation systems |
| | | Project and financial request procedures, internal auditing |
| | | Surveys, stakeholder meetings/participation, performance reviews |
| | Reporting | Daily (operation reports) |
| | | Monthly (senior admin) |
| | | Annually (auditors, gov`t) |

## Organizational Reporting

Organizational reporting is made up of the information gathered through continuous improvement systems. In addition to ensuring compliance, reporting improves transparency and awareness for stakeholders. Reporting on key indicators provides a framework that will improve understanding of the organization's goals in addition to progress. Consequently, reporting can also be used to motivate stakeholders and improve the reputation of the business.

Information for reporting can be pulled from any type of measurement control process but the level of detail and ease varies. Internally, the organization requires departments to comply with particular work procedures and standards, which get translated through daily, weekly, monthly, and yearly reporting. Internal reporting varies, with some organizations holding themselves to formal internal auditing procedures, to some with in-house protocol. More formal procedures are often accompanied with a hierarchy of protocol, including such things as daily

checklists, ongoing training, and strict record keeping, followed by regular auditing. Many organizations have an internal auditor on staff to ensure compliance.

Externally, there is a variety of industry, provincial, and federal mandates that an organization must comply with, which varies across sectors. External compliance tends to focus in the areas of finance, procurement, health and safety, environment and energy, and quality control (which drive internal reporting practices). External reporting includes both required and voluntary reporting. Often, voluntary reporting is required when an organization has adopted a particular certification, such as through ISO. Voluntary reporting is increasing however, particularly in environmental and social certifications, such as with carbon emissions, organic status, and fair trade.

In terms of measurements within reports, metrics will vary from report to report as well as within reports; the units of measurement will either be determined internally through voluntary reporting, or by external mandates. The indicator development within Stage 2, step 1 (Topic of Measure) will help guide the reporting process in terms of the key elements to report on. Step 1 summarizes the topic of measure, which comprises overall goals and areas of focus that influence day-to-day operations, as shown in Table 6. Stage 2, step 1 (Unit of Measure) provides information on the relevant metric to use. The measurement phase allows the organization to organize the goals in order to then attach actions and metrics. Using this information, the organization is then able to establish a verification process to measure performance, which is done via the uniquely fashioned indicators and any supplemental qualitative practices, as showcased in Table 9.

Table 9: An example of organizational goals and associated triple bottom-line action items within a verification process shows progression of indicator development.

| DIRECTIVES | | | | MEASUREMENT & VERIFICATION | | | |
|---|---|---|---|---|---|---|---|
| Goal | Triple b-line drivers/Issues | Actions | Issues | Metric/Gauges | Tools | Unit | Measurement Frequency |
| Promote finance models that reduce risk to the organization | **Financial & built capital (Economic)** | Improve deferred maintenance ratio/ list through: <br>• New builds and renos <br>• Energy savings revenue | Profit, funding, borrowing, investing, etc., <br><br>Energy efficiency <br><br>Building quality/ user experience | Quality control ratios <br><br>Health and safety instances <br><br>Return on investment <br><br>Fines <br><br>Credit rating <br><br>Deferred maintenance | Meters, building automation systems <br><br>Project and financial request procedures, internal auditing | Number (5yrs) <br><br>Monetary <br><br>Consumption (kwh) | Daily (operation reports) <br><br>Monthly (senior admin) <br><br>Annually (auditors, gov`t) |
| Leverage stormwater management programs/ incentives | **Natural capital (Environmental)** | Implement a native and low maintenance landscaping program <br>• Salt use <br>• Cisterns <br>• Green roofs | Pollution, energy use, biodiversity, resource depletion, wastes, credits/ incentives | Environmental incidents <br><br>Emission levels <br><br>Biodiversity levels <br><br>Waste, energy, water, fuel levels <br><br>Land use ratios | Waste audits (unprocessed or disposed materials, etc.), <br><br>Emissions <br><br>Inventories/ land use surveys | Percentage <br><br>Ratios <br><br>Emissions (CO2e) <br><br>Consumption (m3, etc.) | Daily (operation reports) <br><br>Monthly (senior admin) <br><br>Annually (auditors, gov`t) |
| Improve professional development levels | **Human Capital (Social)** | Provide time off for volunteering/ training | Reputation/ ratings, training & development, stakeholder involvement and partnership, wages & benefits | Complaints <br><br>Demographics/ retention <br><br>Leaves/ absences <br><br>Participation | Human resources information systems <br><br>Performance reviews | Percentage <br><br>Numbers/ hours <br><br>Ratios | Daily (operation reports) <br><br>Monthly (senior admin) <br><br>Annually (auditors, gov't) |

# Chapter 6: Findings

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Widespread examples of seamless triple bottom-line management systems are not yet commonplace; however, there is momentum towards sustainability management in business. Increasingly, organizations are creating or expanding divisions dedicated to sustainability and climate change services, particularly in regards to auditing and reporting practices. This expansion drives the suppliers, vendors, and customers of these organizations to develop their own strategy in order to comply with developing standards.  In addition to compliance to internal and external mandates, this shift is also driven by the desire to improve efficiency levels and stakeholder reputation.

Still, even with these drivers, sustainability-related principles are often only seen in an organization's mission statement or policies, as compared to day-to-day operations. The gap is largely due to the fact that the concept of sustainable business operations has not been clearly translated into a common operations framework. Some organizations are taking some operational steps; however, there are often no formal processes of assessment, goal setting, implementation, measurement, and review. Consequently, the efforts have little impact because of fragmentation within the business system.

Transition from an informal or semi-formal approach to a more formal one helps to improve control of day-to-day operations for a more practical and holistic approach. Formalizing the approach includes a process of embedding and then maintaining the management system in a cyclical manner by following a natural progression of data gathering, goal setting, implementation, and review. It can be concluded that this cyclical process is natural to a business system that incorporates feedback and continuous improvement.

Table 10 outlines the management system framework that attempts to create this process. Throughout, the framework follows a progression of steps that allows an organization to insert their own unique profile, mission, and operational activities. Beginning with the boundaries, the organization outlines the structure of planning itself, such as the length of assessment and planning that will be undertaken during the process of completing the review and also the frequency of further review. This stage also includes identification of capacity and functionality in terms of size and structure of what will be included in the review, such as number and size of buildings or space and departments as well as the roles of people in this process - who they are and what part they play, with thought to future trends.

Similarly, the next stage of strategic and operational analysis allows the organization to frame their goals and associated operations by studying the inputs, processing, and outputs of materials, energy, and information flowing through the organizations. Administrative structures are necessary to guide daily operations. Without these controls, business operations are not working towards the common goals of the organization and have no metrics to measure progress. Organizational programs and procedures must be informed by the overall strategy of the organization, which are measured and reported on by representative indicators.

Rather than prescribing specific items to look for, the framework provides the structure to follow during this assessment process, and also what needs to be considered in terms of resource

flows. The structure and resource flows represented in the strategic and operations section of the framework are designed to be common to all organizations. This is the organizational-specific information that informs the indicator design process, which similarly follows a natural progression of defining the topic and scope of indicator and associated units of measure. Finally, the framework offers methods, techniques, and considerations for measuring and reporting on performance of the management system.

Table 10: Summary of the framework for implementing a triple bottom-line management system in an organization

| STAGE | STEPS | FACTORS |
|---|---|---|
| **ASSESSMENT** | Organizational Boundaries | Temporal<br>• Span of planning<br>• Work and free time<br>Spatial<br>• Capacity of space and people<br>• Functions of space and people<br>• Structure & scope<br>Demography<br>• Internal and external stakeholders<br>• Trends |
| | Strategic | Mission<br>• Overarching directive, based on customer base, history, and direction<br>Guiding principles<br>• Guidance irrespective of strategic changes<br>• Policies, procedures, & programs<br>• Administrative controls that promote mission and principles |

| | | |
|---|---|---|
| | | Regulations<br>• Internal and external mandates |
| | Operational | Inputs<br>• Investment and resources<br>Processing<br>• Information and energy directing inputs<br>Outputs<br>• Distribution of resources |
| | Communication Network | Informal<br>• Periodic awareness strategies<br>Formal<br>• Systematic directives |
| **INDICATORS** | Topic of Measure | Goal<br>• Overall objectives based on assessment strengths and weaknesses<br>Action<br>• Operational information to achieve goals |
| | Scope of Measure | Range<br>• Organize by common characteristics or activities<br>Value<br>• Assign a weight based on the organizational mission to create hierarchy within:<br>   o Financial & built capital<br>   o Natural capital<br>   o Human capital |
| | Unit of Measure | Baseline<br>• Information to measure progress against<br>• Metric<br>• Numeric way of measuring progress<br>Verification<br>   o Scan internally and externally |
| **VALIDATION** | Measurement Tools | Meters, automation systems<br>Project and financial request procedures, internal |

| | | auditing |
| --- | --- | --- |
| | | Surveys, stakeholder meetings/participation, performance reviews |
| | Reporting | Daily (operation reports) |
| | | Monthly (senior admin) |
| | | Annually (auditors, gov`t) |

It has been argued in this paper that organizations are able to improve efficiency and compliance levels as well as reputation by embracing a triple bottom-line approach. In terms of efficiency, the material flow analysis approach allows an organization to capture the full-scale and impact of inputs, processes, and outputs of materials energy and information to fully understand performance. In addition to being able to manage resources more efficiently, this awareness and control of operations improves the ability of the organization to respond to internal and external mandates. Satisfying mandates and conserving resources subsequently creates a positive perception to its stakeholders, from staff and customers, to investors, board members, and the broader community.

## Limitations and Future Research

This paper identifies the lack of cross-sectoral, holistic, and non-intensive sustainable management frameworks as major gaps in research and application and responds with the triple bottom-line framework. Accordingly, the intention of the framework is to provide the means to create a triple bottom-line management system, based on the nature and needs of a particular

organization. The generic nature of the framework is indeed meant to be widely applicable; however, this approach can limit reliability in terms of a verifiable comparison mechanism for benchmarking, reporting and ranking purposes. Consequently, the framework in this paper will ideally increase the number of organizations framing and managing their organizations according to a triple bottom-line approach, but will not necessarily further progress in the development of a common metric system across business operations.

Further work must be done in developing a common approach to achieve wide-scale application and comparable metrics. To capture the entire process, the approach should include organizational assessment, indicator development, review, and reporting. In particular, the assessment of operational inputs, shown in Stage1, Step 3: Identify the Operations of the Organization and all steps within the development of indicators in Stage 2 would benefit from more detailed or prescriptive guidance. Regarding Stage 1, some organizations may appreciate having a list of inputs, processes, and outputs of material, energy, and information flows, including subsystems that should be included in the assessment. The prescription would direct a more detailed and consistent inventory process, which will then influence the development of indicators.

Similarly, a specific set of triple bottom-line indicators would help commonality given the concept of sustainable business practices are subject to individual views on the topic (Bond and Morrison-Saunders 2011) and the role in the organization. Sustainable indicators have been developed in both academic and professional contributions with the goal of providing consistency and comparability; however, there is no common application. The inconsistencies lead to a varied set of indicators within many different sizes and sectors of organizations, which restrict the ability of organizations to perform comparative benchmarking activities; thus, preventing knowledge transfer, understanding, and acceptance in this emerging management approach. Further issues

arise when reporting bodies use a large number of indicators, which are often on top of reporting requirements already in place. Accordingly, a concise and comprehensive set of sector specific indicators would likely greatly increase uptake.

The ability for organizations to benchmark, report, and participate in ranking is very important for performance measurement and visibility. This is particularly true in sustainability management where metrics and comparison are necessary to prove viability given the field is still considered an emerging trend. Accordingly, common measurement schemes will benefit this process. The closest generic framework that exists is from the Global Reporting Initiative, which is used widely by organizations. Though GRI's protocol does not guide organizational assessment or integration, the reporting required from the framework prompt changes within the management plan that do not discriminating across sectors, which accounts for its wide-scale uptake.

To develop a more prescriptive framework, while understanding the differences between sectors and sizes of organizations, a solution may be to provide separate versions of a parallel framework. For consistency, the framework should follow the same overall format and maintain consistencies where possible, while reflecting the assessment or indicator development process for a particular industry. To do this in a manageable way, sectors could be based on common divisions, such as industry, commercial, and institutional, in addition to size, and could include all possible considerations as necessary, i.e. emissions factors used by medium-sized industry. The size of an organization will help inform key metrics, based on the mandates that organizational industry and size is subject to – organizations of a certain size have distinct requirements, which are generally outlined by the governing body (e.g., Ontario Ministry of Energy's Green Energy Act and the Ontario Occupational Health & Safety Act).

## Summary

This paper reviews processes found within triple bottom-line management and material flow analysis research that work to create and maintain management systems. Subsequently, the framework brings together the processes that encourage holism and transferability within the steps of assessment, indicator development, and measurement and verification. The framework intends to standardize explicit information where possible; however, future research could add to specifications – most likely in the operational assessment and indicator development stages. This balance will benefit comparison, which will further benefit uptake as organizations are increasingly looking to benchmark, rank, and report on performance. Efficiencies, regulations, and stakeholders are driving organizations to take on change, which makes the need for a framework to guide this change increasingly relevant.

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