Sustainability Reporting:

An analysis of programs and metrics reported by top manufacturers in New England

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Abstract

Corporations are increasingly adopting sustainable development principles and expanding sustainability reporting programs to demonstrate value to their stakeholders. Economic value can be realized by enabling more efficient production of goods and reputation can be enhanced by reporting environmental practices. This research utilized content analysis and interviews to evaluate the extent of sustainability reporting among 47 publicly-traded manufacturers in New England. The findings indicated that approximately half of the companies prepared sustainability reports. The majority of reporting organizations had annual sales revenue over $1 billion and employed more than 1,000 workers. A total of 139 different environmental metrics were identified among the sampled sustainability reports and approximately one third of them were verified externally. The sampled companies utilized numerous reporting mechanisms and voluntary standards. The wide variety of formats and complexity underscores the need for standardization. Based on this research, significant opportunities exist to develop and expand sustainability reporting programs among sampled New England manufacturers.

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Chapter 1: Introduction

In a competitive economy corporations are increasingly adopting sustainable development principles, often referred to as "sustainability", and publicly disclosing these initiatives to demonstrate value to their stakeholders. The United Nations (UN) Brundtland Commission's report *Our Common Future* was published in 1987 and was a catalyst for increased attention to business' responsibility to participate in advancing sustainable development. The report defined sustainable development as "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 41). Companies that subscribe to sustainable development principles utilize a "triple bottom line"[1] approach and consider the social and environmental impacts of their business decisions in addition to the economic consequences.

Sustainability reporting describes the process of conveying environmental and social initiatives to the general public and it is becoming increasingly widespread throughout the business community (Archel, 2007; Daub, 2007; Roca and Searcy, 2012; Zhang, Rio, Allais, Zwolinski, Carrillo, Roucoules, Mercier-Laurent, and Buclet, 2013; Schalteggar et al., 2006). There are a number of reporting guidelines, such as the Global Reporting Initiative (GRI), and voluntary standards

[1] The term "triple bottom line" refers to people, planet, and profit.

available to companies to monitor, manage, and report their sustainability initiatives. Guidelines and standards may require documentation of specific metrics or provide a framework to develop custom environmental management systems. Due to the existence of numerous guidelines and the voluntary nature of these programs, a wide variety of detail and complexity can be found among published sustainability reports (Hahn and Kuhnen, 2013; Zhang et al., 2013).

There are several methods available to convey sustainability measures to the company's stakeholders, including consumers, investors, and suppliers. Businesses can use a formal reporting platform, such as the GRI, develop their own stand-alone report (based on available information and willingness for public disclosure), and/or include information in their annual report. Note that these alternatives are not mutually exclusive. For example, firms may prepare a stand-alone report that also conforms to the GRI guidelines. Based on interviews conducted during this research, a number of organizations conduct sustainability initiatives but choose not to prepare sustainability reports. These companies often retain information for internal use only, such as for quality control or facility operation and management purposes.[2]

The primary rationale for adopting sustainability initiatives is to increase the value of the organization. Sustainability initiatives provide opportunities for companies to become more efficient by using less resources and energy, thereby

[2] Since this analysis reviews publicly-available sustainability documents, a full discussion of the internal use of this information is outside the scope of this research.

contributing positively to the bottom line. Sustainability initiatives also provide intangible value such as reputation and branding (Archel, 2007; Brown, Jong and Levy, 2009; Epstein, 2008; Hahn and Kuhnen, 2013; Herzig and Schaltegger, 2011; Orsato, 2009; Wales 2010).

Sustainability programs and reporting are voluntary[3] and as such are conducted in addition to mandated regulatory standards (often described as "beyond compliance" initiatives). These programs are critical to extend the ability of regulations to improve worker health and safety and to protect the environment. For example, voluntary initiatives can reduce greenhouse gas (GHG) emissions by installing energy efficient appliances and supporting renewable energy sources. Water use can be improved by installing low-flow appliances and collecting condensate and rainwater. Lastly, waste can be reduced by encouraging aggressive recycling and closed loop manufacturing programs in an attempt to address landfills which are at their capacity.

In addition to improving environmental conditions, sustainability initiatives provide opportunities for companies to signal their intention to support long-term social and economic objectives within the community. These initiatives provide platforms for corporations to offer economic resources and stimulate

[3] Although preparation of a sustainability report or presenting sustainability-related information in the annual report is considered voluntary at this time, collection and reporting of specific metrics within the report may be mandated by regulations. For example, in Massachusetts large emitters may be required to measure and report CO_2 emissions to regulators.

communication between management and the public. In addition, sustainability reporting promotes transparency between the company and stakeholders, and ensures the business is held accountable for their activities.

Due to the importance of sustainability to the corporation, community, and the environment, this research was undertaken to extend the literature on sustainability reporting and to understand the programs employed by New England manufacturers. The analysis included a review of 47 publicly-traded manufacturers in the New England region.

Content analysis was utilized to review publicly-available documents and company interviews were conducted to provide additional insight to the research. Note that this analysis focused solely on environmental indicators and their associated reporting. Manufacturing was selected among industry sectors due to its intense resource requirements, high energy and water demands, and potential for significant waste generation. Based on these assumptions, implementing sustainability initiatives within the manufacturing industry could provide opportunities to protect natural resources and improve waste management processes (Gunasekaran and Spalanzani, 2012), as well as mitigate other environmental impacts.

To further understand the extent of sustainability reporting among New England manufacturers, the following questions were asked:

1. Of the top manufacturing organizations in New England, how many are producing sustainability reports and what formats do they follow?
2. What environmental metrics and indicators are being monitored by these organizations?
3. How many of these reports and organizations are verified by external sources?
4. How does the format and depth of sustainability reporting vary by state, company size, sales volume, and the firm's visibility in the marketplace?

Understanding the extent of sustainability reporting in New England provides valuable insight into the business community's response to address issues such as climate change, water scarcity, limited raw materials and resources, environmental pollution, and surpassed landfill capacities. This information can be combined with other state and regional sustainability data in order to fully understand the extent of initiatives currently underway and identify opportunities to improve or expand existing environmental policies. By summarizing the extent of sustainability initiatives reported by the top New England manufacturers, this analysis can provide information to organizations beginning to report their data or expanding their environmental programs. Companies can learn from other businesses and compare initiatives to fully understand and develop opportunities within their organization.

Chapter 2: Literature Review

Sustainability reporting is becoming increasingly widespread throughout the business community (Archel, 2007; Daub, 2007; Roca and Searcy, 2012; Schalteggar et al., 2006; Zhang et al., 2013) as a means of conveying environmental data and social initiatives undertaken by an organization. Sustainability programs are voluntary [4]and as such are conducted in addition to mandated regulatory standards (often described as "beyond compliance" initiatives). According to Herzig and Schaltegger (2011), "Recent decades have witnessed an exponential growth in non- or extra-financial reporting such as environmental, social or sustainability reporting" (p. 151). There are a variety of methods and venues available to convey sustainability measures to intended audiences, including consumers, investors and other businesses. Companies can use a formal reporting platform, such as the GRI, develop their own stand-alone report (based on available data and willingness to disclose information to the public), or include material in their annual report.

Based on the literature, a wide variety of detail and complexity can be found among published sustainability reports (Hahn and Kuhnen, 2013; Zhang et al., 2013). In addition to the GRI, other possible outlets include the Carbon Disclosure Project (CDP), the Corporate Register, and the Climate Registry,

[4] As described above, select metrics and indicators measured and reported under voluntary sustainability programs could be required by law in some cases.

among others. Companies can also signal sustainability by obtaining the International Organization of Standardization (ISO) 14001 certification, an internationally-recognized environmental management systems standard.

Firms may choose to certify their report and data using a third party organization such as the GRI, an industrial trade group, non-governmental organization (NGO), environmental auditor, or consulting firm. Other companies may highlight intended adherence to a certain standard without actual verification of the data. Some organizations produce sustainability reports for internal use only, such as for quality control, operations improvement, and management training, while many other firms opt out of sustainability reporting altogether.

As discussed below, reporting can offer attractive economic paybacks to the company, including intangible benefits such as reputation and branding.

2.1 Defining Corporate Sustainability

From a terminology standpoint, the terms “sustainability”, “corporate sustainability”, and “sustainable development” can be interpreted and defined differently by stakeholders (Herzig and Schaltegger, 2011). For example, Schaltegger et al. (2006) suggests that corporate sustainability requires not only satisfying today’s investors and employees, but must also consider future stakeholders as well. Jacobsen (2011) posits that sustainability involves managing businesses with a long-term horizon and ensuring that resources will be available indefinitely. Corporate sustainability can be viewed as a management

strategy for conducting business and implies that the company's actions support long-term sustainable goals within the organization, as well as the development of the community and economy as a whole (Schaltegger et al., 2006).

One of the key individuals responsible for defining corporate sustainability is John Elkington. According to Elkington, who coined the term "triple bottom line" in 1994 (Elkington, 1994, 1998), firms not only need to be profitable but have a responsibility to their community and the environment. Elkington writes, "Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality, and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line" (Elkington, 1998, p. 397).

In addition to understanding the triple bottom line, researchers have recently focused on studying the interrelationships between "people, planet and profit" (Schaltegger et al., 2006). For example, implementing policies to address environmental concerns, such as waste reduction, also impacts social well-being by removing pollutants from communities and increases profitability by reducing disposal costs. After implementing these policies, companies can communicate these initiatives to their stakeholders and the general public to improve their reputation in the community.

Along with the multiple interpretations of sustainability, there are several definitions of sustainability reporting that can be identified in the literature.

Arguably one of the most descriptive is provided by the World Business Council for Sustainable Development (WBCSD). "We define sustainable development reports as public reports by companies to provide internal and external stakeholders with a picture of the corporate position and activities on economic, environmental and social dimensions" (Daub, 2007, p. 76; Roca and Searcy, 2012, p. 105). A simpler version contends that sustainability reporting equates to publication of data and reports online or in printed format (Schaltegger et al., 2006).

2.2 History of Non-Financial Reporting

The concept of one dimensional reporting, which is defined as providing either financial data, discussions of the company's social impacts, or summarizing environmental emissions or waste, has been around for some time (Schaltegger et al., 2006). For example, evidence of corporate financial reporting can be found as early as the nineteenth century. In the mid-twentieth century, corporate annual reports often included information related to the community and employee matters (Herzig and Schaltegger, 2011).

The first exclusive non-financial reporting began in the 1970s as social reporting. During this time, companies began to report on how their processes and services impacted communities. Firms also published goals to improve social conditions related to their business activities (Herzig and Schaltegger, 2011). In 1973, Abt. Associates in Cambridge, MA produced one of the first non-financial reports with

a balance sheet and income statement dedicated to measuring social impacts from business operations (Epstein, 2008).

Environmental reporting began in the 1980s and often focused on ecological effectiveness, which is defined by Herzig and Schaltegger (2011) as the total impact to the environment from a company's operations. The emergence of two dimensional reporting began in the mid-1990s. In most cases, the two dimensions were financial and environmental. However, there was some evidence of economic and social reporting (Schaltegger et al., 2006) as well. Sustainability, which focuses on social, environmental and economic aspects of the business, became the focus of reporting in the mid-1990s. According to Herzig and Schaltegger (2011), the purpose of the reports was to convey the company's initiatives that exemplified sustainable development. In 1999, Shell produced one of the first stand-alone sustainability reports. It was appropriately titled the "Triple P-Report" for people, planet and profit (Herzig and Schaltegger, 2011, p. 156).

2.3 Trends in Sustainability Reporting

According to Stubbs et al. (2013), a 2004 report by the United Nations Environment Programme (UNEP)/SustainAbility calculated a 600% increase in sustainability reporting in less than a decade. Wales (2010) suggests that organizations understand the benefits of implementing sustainable business practices and are seizing the opportunity to adopt these initiatives. The ability to

minimize social and environmental costs has also led to increased management of these activities by corporations, as well as the preparation of greater numbers of sustainability reports (Epstein, 2008).

Sustainability recognizes that the impacts of businesses affect the environment and individuals outside the organization, such as nearby residents and the community. This includes parties without a financial stake in the company. Corporations can also impact future generations, such as through resource extraction and waste disposal. According to Schaltegger et al. (2006), these considerations and discussions are fairly recent in the business and sustainability realm.

Based on the literature, large, multinational corporations comprise the majority of reporting companies, especially public organizations (Stubbs, Higgins and Milne, 2003; Marshall and Brown, 2003). However, there are many small and medium-sized businesses that also impact the environment, especially when the effects of these companies are viewed as a whole. Since small and medium-sized businesses represent a significant portion of the national and international economy, they should be included in the sustainability reporting process (Herzig and Schaltegger, 2011).

Studies suggest greater visibility, enhanced access to resources, and greater societal pressure are motives for larger companies to engage in sustainability reporting. Reviews of companies included in the largest business indices (both in

the United States and globally) demonstrate high percentages of reporting. For example, in 2005, 43 of the firms in the S&P 100 produced sustainability reports, 79% provided information on sustainability on their websites, and 12 reported for the first time (Epstein, 2008). A review of the S&P 500 companies demonstrates a significant upward trend in sustainability reporting. In 2011, less than 20% of all S&P 500 companies reported on their sustainability initiatives. In 2012, the percentage increased to 53% of all S&P 500 firms. The most recent data for 2013 shows that 72% of all S&P 500 companies now participate in some form of sustainability reporting (Governance and Accountability Institute, 2014).

Similar results can be found in Fortune Global 250 companies. In 2005, 54% of these firms produced a separate sustainability report and 20% included a section on sustainability in their annual report (Epstein, 2008). As of 2011, Stubbs et al. (2013) reported that 95% of Fortune Global 250 companies were involved in sustainability reporting. Although a high percentage of companies included in the major business indices prepare sustainability reports, Stubbs et al., (2013) note that only 2,000 of the estimated 60,000 multinationals actually produce reports.

In addition to an increase in reporting among large companies, other sustainability reporting trends include attempts to expand the report's intended audience, providing governance details of the organization, reporting data based on geography (rather than producing one report within a large, multinational company), and incorporating financial and sustainability data into a single report (Brown et al., 2009). Ranking and competition between sustainability reports are

also becoming more prevalent. Herzig and Schaltegger (2011) posit that ranking reports will help standardize the reporting process, as well as expand discussions surrounding the topic. The authors also contend that ranking sustainability documents provides an opportunity to conduct more extensive research on the material.

Publishing sustainability reports online is also becoming more common. This provides an opportunity to increase public access to the data, as well as provide more information to stakeholders. According to Herzig and Schaltegger (2011), opportunities to improve communication and promote discussion of sustainability is greatly enhanced by online reporting.

Although trends indicate an increase in sustainability reporting, critics maintain that there are still few reporting companies, especially among small and mid-sized businesses. Other critiques of sustainability reporting include low reporting quality (Archel, 2007), data problems, low readership, and not enough quantitative indicators (Brown et al., 2009).

2.4 Rationale for Reporting

According to the literature, there are many reasons for implementing an environmental sustainability reporting program. These include improving reputation and branding, increasing company legitimacy, benchmarking against goals, demonstrating transparency, revealing competitiveness, and encouraging employees (Hahn and Kuhnen, 2013).

Of these, enhancing brand value, especially as compared to competitors, appears to be the primary purpose of sustainability reporting (Zhang, 2013). The value can be realized in terms of economic performance, such as additional sales from customers, increases in employee productivity due to involvement in company decision-making, or avoidance of environmental penalties and fines. Value can also be intangible (Orsato, 2009), such as improved company reputation, branding, and legitimacy. As the name implies, it is difficult to assign a monetary value to these benefits. However, in some cases organizations attempt to quantify non-tangible value to justify the costs of implementing these programs. Since valuation can be challenging, Orsato (2009) argues that the value of sustainability and environmental programs do not always have to be quantified.

One of the most common examples of both tangible and intangible value in the literature is competitive advantage. The term competitive advantage was introduced by Michael Porter in his 1985 book *Competitive Advantage: creating and sustaining superior performance*. Competitive advantage is referenced throughout the literature (Herzig and Schaltegger, 2011; Orsato, 2009) to describe the value of sustainability reporting. The two foundations of competitive advantage are a reduction of costs and differentiation from competitors (Orsato, 2009). One approach to differentiate companies is through sustainability reporting. Sustainability reporting could provide a competitive advantage over those companies that do not prepare them (Herzig and Schaltegger, 2011).

In addition to maintaining a competitive advantage, companies report on their sustainability initiatives to enhance their reputation. This is one of the most frequently cited justifications in the literature for explaining why organizations adopt sustainability reporting practices (see Archel, 2007; Brown et al., 2009; Epstein, 2008; Hahn and Kuhnen, 2013; Herzig and Schaltegger, 2011; Orsato, 2009; Wales, 2010 and others). In some cases, especially for heavily-scrutinized companies, sustainability reporting can be primarily about managing reputation (Orsato, 2009). Business and investor indices that measure corporate legitimacy demonstrate a clear positive connection between sustainability reporting and reputation (Orsato, 2009). As an example, Orsato (2009) points to Shell's use of sustainability reporting following damaging incidents in Nigeria and with the Brent Spar oil rig in the North Sea. He suggests that sustainability reporting did not completely eliminate controversies, but allowed the company to minimize damage to their reputation.

In line with enhancing reputation, sustainability reporting can also serve to legitimize businesses or rationalize specific decisions within an organization (Daub, 2007; Hahn and Kuhnen, 2013; Herzig and Schaltegger, 2011; Marshall and Brown, 2003). Reporting can also be used to "…gain, maintain and repair legitimacy" (Herzig and Schaltegger, 2011, p. 152). The overall purpose of establishing legitimacy is to increase public support for the company's products, brand, and image.

Risk management is also a highly-referenced motive for sustainability reporting (Gunasekaran and Spalanzani, 2012; Herzig and Schaltegger, 2011; Orsato, 2009; Wales, 2010), especially in the energy and oil industries. Orsato (2009) points out that energy and oil companies budget large sums of money not only to conduct sustainability programs but to communicate these initiatives to the public. These organizations are typically high profile companies that operate in sensitive environmental areas and have significant impacts on natural resources and on communities.

Companies who prepare sustainability reports can also gain an advantage over their competitors by measuring and better managing their operations. This can be an important consideration for companies deciding to implement a sustainability reporting program. Data collected during reporting can lead to increased energy efficiency (Gunasekaran and Spalanzani, 2012), reduced water intensity, decreased waste (Gunasekaran and Spalanzani, 2012), improved resource allocation (Epstein, 2008), and reduced energy costs (Yudelson, 2010). For example, by measuring energy costs, companies become aware of the potential to reduce their electricity charges through the use of newer, more efficient equipment or alternative utility pricing mechanisms.

In addition to better managing internal operations, the process of identifying issues, finding solutions, and including employees in the decision-making process can be beneficial to the company. The increased participation not only identifies cost saving measures as described above, but motivates workers as well

(Schaltegger et al., 2006). Brown et al. (2009) concur that sustainability reporting engages employees and strengthens their commitment to the company through the process of inclusion and involvement in company management and operations.

Another important rationale for participating in sustainability reporting is stakeholder pressure. Companies will often prepare sustainability reports to satisfy stakeholder demand. Stakeholders can include customers, suppliers, investors, shareholders, and employees. Other interested parties may also have an influence on the organization. These include the community, media, the government, trade associations, and NGOs.

Stubbs et al. (2013) posit that companies will implement sustainability reporting in an effort to strengthen public relations when pressured by stakeholders and the media. According to Hahn and Kuehnen (2013) and Stubbs et al. (2013), stakeholders have a responsibility to pressure companies in order to increase the number of reporting organizations. However, as noted by Epstein (2008) organizations respond differently when confronted with stakeholder pressure. The position and power of the stakeholder is important, and companies respond favorably to powerful and legitimate stakeholders, as determined by the organization (Stubbs et al., 2013).

Investors are often well-suited to pressure organizations to include environmental and social issues with their financial data (Herzig and Schaltegger, 2011), as they provide economic resources to the company and represent powerful stakeholders.

Investors request financial and non-financial information to assist them with making better decisions about investing in a company (Epstein, 2008). However, Brown et al. (2009) argues that traditional investors are only concerned with economic performance. They suggest that environmental and social reporting may be of little importance to traditional investors.

Investor organizations, such as the Investor Responsibility Research Center, rate companies based on environmental risk, emissions, fines, and penalties (Bhat, 1996). The Forum for Sustainable and Responsible Investment (US SIF) also provides information to investors to support companies based on their environmental and social performance, as well as their governance structure (US SIF, 2014). Annual reports and sustainability data can also be used to improve investor relations and demonstrate the company's ability to achieve a positive economic return on an investment. Not only is the information itself important, but the act of transparency also plays an important role in investment decisions. An openness regarding company information can help reduce risk and uncertainty for investors. Epstein (2008) explains that communication between a company and its stakeholders is a critical factor for investors.

There are several other rationales described in the literature for establishing sustainability reporting programs. These include benefits such as brand marketing (Marshall and Brown, 2003), business generation (Herzig and Schaltegger, 2011; Wales, 2010), improved credit (Epstein, 2008), elevated customer loyalty (Wales, 2010), greater trust (Epstein, 2008), improved business

efficiency (Herzig and Schaltegger, 2011), and product innovation (Gunasekaran and Spalanzani, 2012).

Although there are many positive rationales for sustainability reporting, many companies still opt out of the process entirely (Stubbs et al., 2013). Stubbs et al. (2013) conducted a study to understand non-reporting organizations and the factors that influenced their decisions. The rationales identified for non-reporting included lack of stakeholder pressure, lack of perceived benefits, concern about sharing potentially damaging information, and little desire to be identified as a sustainability leader. Stubbs et al. (2013) found that reporting only occurred in organizations where it was important to the chief executive officer (CEO) and/or upper level management. In addition, the management's view towards sustainability affected the entire company's position on the subject (Stubbs et al., 2013).

In summary, non-reporters felt like implementing sustainability initiatives would be a good elective endeavor. However, they also believed that it was certainly not required to operate a successful business (Stubbs et al., 2013). If nobody asks for the information, non-reporting companies believed there was little incentive to incorporate sustainability into their organization. However, even among organizations that chose not to report, many believed sustainability reporting will be mandated in the future through regulations, or at least will be required to conduct business due to stakeholder and public expectations (Stubbs et al., 2013).

As described above, firms have various reasons for reporting their sustainability initiatives. These include economic, social, liability, and other influential pressures (Stubbs et al., 2013). Regardless of their motivation, it is clear that the demand for companies to report on their sustainability initiatives is increasing (Epstein, 2008; Marshall and Brown, 2003). Epstein (2008) maintains that not only have pressures been successful in convincing companies to report on their sustainability initiatives, but the number of reports as well as the quality of the content has improved in recent years.

2.5 Preparation of Sustainability Reports

Companies produce stand-alone reports or combine environmental and social data into their annual report to showcase their sustainability initiatives. Reporting guidelines, such as the GRI, can influence the content of the reports. Stand-alone reports generally provide information on the environmental and social aspects of sustainability within the organization (Herzig and Schaltegger, 2011) and may include some economic data. The annual report contains mostly financial information and is considered the main communication tool with investors (Bhat, 1996). The Securities and Exchange Commission (SEC) mandates minimum content and disclosure requirements for the annual report, and companies have the option to include additional information as they determine necessary. For example, companies may include basic information regarding the firm's social and environmental initiatives (Bhat, 1996). According to Epstein (2008), the opening president's letter of the annual report is a common place for companies to

describe their sustainability programs. Stubbs et al. (2013) maintains that changes to the annual report as mandated by the SEC could be used to expand disclosure requirements related to social and environmental issues, and would result in companies incorporating sustainability into their governance structures, as opposed to simply operations management practices.

The preparation of sustainability reports can be conducted internally by environmental health and safety officers, sustainability managers, facilities personnel, or communications departments. In addition, a large number of organizations hire outside consultants to prepare the reports. Some of the most common consultants include SustainAbility, AccountAbility, KPMG, Price Waterhouse Coopers, Ernst and Young, and Deloitte and Touche.

Due to the potential for a variety of preparers, the content and format of sustainability reports differs widely, as do the titles. For example, reports can be designated as a "Sustainability Report", "Corporate Citizenship Report", "Sustainable Development Report" or "Corporate Responsibility Report", depending on the preparer (Archel, 2007; Hahn and Kuhnen, 2013; Roca and Searcy, 2012). A number of other naming options exist as well. As in most cases, companies produce one report for their entire organization. However, it is important to note that other options exist including reporting by separate company divisions and facilities, or by geographical location (Epstein, 2008).

The process leading up to the reporting can be slow and daunting (Orsato, 2009) due to the number of stakeholders involved in the process, the decision on what to measure and report, the identification of employees or contractors needed to complete the work, and the alignment of the programs with the company's mission statement and goals. For example, it took Green Mountain Coffee Roasters approximately four years to produce their first sustainability report (Brown et al., 2009) because of the issues noted above.

Prior to reporting, Epstein (2008) maintains that it is critical to carefully consider the content and intended audience, as well as communication outlets. It is also important to align programs and reporting with stakeholder expectations, company goals, and strategic plans (Orsato, 2009). It is not uncommon for organizations to attempt too many sustainability and reporting initiatives without focusing their resources accordingly (Orsato, 2009). Materiality is a tool that can be utilized to assist organizations in determining what to report. According to the GRI, "Material topics for a reporting organization should include those topics that have a direct or indirect impact on an organization's ability to create, preserve or erode economic, environmental and social value for itself, its stakeholders and society at large" (GRI, 2014). The process is similar to the system found in financial reporting (Hsu, Lee and Chao, 2013), and involves a ranking of issues that are deemed important to the business as well as stakeholders (Wales, 2010). According to Hsu et al. (2013), the important aspect of materiality is the ability to focus on specific sustainability initiatives. Due to the large number of programs

available, it can be challenging to differentiate between those initiatives that add value to the organization and those which are unimportant to stakeholders.

Herzig and Schaltegger (2011) also suggest two potential avenues to be used in concert with one another for determining reporting content, the “Inside-Out” and “Outside-In” approach (p. 164). The “Inside-Out” method relies on managers to determine issues and select metrics to benchmark and monitor progress. Herzig and Schaltegger (2011) explain that programs are implemented to address environmental concerns, systems are designed to monitor the results, and companies report the outcome, including future goals. The “Outside-In” approach allows stakeholders to shape the reporting process (Herzig and Schaltegger, 2011). Critics of this methodology suggest that external parties are often not privy to adequate internal information and therefore lack capacity to suggest company improvements (Herzig and Schaltegger, 2011).

After corporations identify programs that match their strategic goals, it is important to hold off on advertising the initiatives until they are well established. Epstein (2008) recommends that organizations work on refining their sustainability goals and improving their economic position prior to attempting to report their data. In addition, Epstein (2008) suggests that solid internal monitoring and reporting structures are in place before attempting to publish the data externally. He further recommends incorporating the use of data and information that is already available, prior to preparing external reports. Bhat (1996) describes the process of reporting as determining the information required

by stakeholders, establishing systems to monitor achievement of goals, and determining how to address shortcomings. This process is the same for both internal and external reporting.

From an internal company perspective, transitioning sustainability and reporting systems into existing management processes is incredibly challenging (Schaltegger et al., 2006). This is arguably one of the most critical aspects of sustainability reporting. In order for programs to be sustainable in the long run, initiatives must be embedded in the company's governance structure and management systems. Programs without clear identification of goals and responsible persons will not produce long-term commitments to sustainability. Sustainability programs must identify who is responsible for collecting measurements and data and describe how the report will be prepared and distributed.

If the company does not invest the time and resources to select initiatives that match their goals and embed programs into core management practices, stakeholders will conclude that the organization is only interested in publicity and branding. This term is known as greenwashing. To avoid this negative publicity, companies must be able to describe their internal policies that contribute to sustainability, address stakeholders' concerns, and report data externally to the public (Herzig and Schaltegger, 2011). Similar concerns regarding the implementation of sustainability programs versus publicity campaigns and marketing were raised by Epstein (2008).

After the initiatives have been selected, it is critical to establish appropriate reporting boundaries. The purpose of identifying boundaries is to convey the operations and/or facilities covered by the reporting. The report should note whether environmental data was collected from all sites or a subset of facilities. It should also include the time period covered by the reporting. The extent of company operations should also be discussed and documented. For example, the report should note whether the data includes all upstream (such as extraction of raw materials and transportation) and downstream (such as waste disposal) activities, or simply the actions conducted within the confines of the facility.

When preparing sustainability reports it is important to utilize straightforward, simple language (Epstein, 2008). Data interpretation can be challenging to the layperson and it is important to identify the target audience (Herzig and Schaltegger, 2011). According to Epstein (2008), a survey of stakeholders indicated that the length of sustainability reports did not matter as long as the proper content was available. However, respondents were not inclined to read more than 50 pages of a report regardless of the content. It is also important to note that two-thirds of the readers acknowledged they would spend 30 minutes or less reviewing the report. With regard to report length, Epstein (2008) maintains that the key objective is to ensure that all necessary data has been provided to stakeholders.

In addition to including pertinent sustainability metrics and data, firms may want to consider other information such as a discussion of voluntary indicators that

could become mandatory regulations in the future, provide an overview of what the firm's competitors are reporting, and/or explain why certain information or data might be absent from the reporting (Epstein, 2008). In summary, establishing reporting content should be tailored to the individual company and address their specific needs (Epstein, 2008).

Even if reports are prepared accordingly, Brown et al. (2009) cautions that "report fatigue" can occur after publishing the initial document. This can lead to low readership, and more importantly a loss of emphasis on the firm's sustainability programs. As discussed above, sustainability initiatives and reporting objectives must be embedded in the organization's management and operating systems. Due to the potential for "report fatigue" among preparers and variable interest among stakeholders, Brown et al. (2009) posit that organizations might begin reporting on a biennial basis in the future.

Although companies attempt to produce accurate sustainability data that reflects their strategic goals and business model, it is important to realize the limitations of reporting. For example, the geographical and temporal scale of sustainability can be difficult to address in a corporate context (Herzig and Schaltegger, 2011). Sustainability reporting can also only be an estimate of a corporation's progress towards sustainable development. Archel (2007) argues that a true representation of sustainable development is incredibly complex and would require a systems-wide approach that is beyond the scope of most organizations. To accurately

determine sustainable development, intricate analysis would have to consider biodiversity, as well as material flows (Archel, 2007).

As described above, there are many challenges for companies who prepare their own reports, but there are also many benefits. This is especially true in the beginning of the process, as initial interest is often high and employees respond positively to the challenge. The process can strengthen the relationship between companies and employees and can lead to innovative solutions. Engaging employees in identifying inefficiencies, finding alternatives, and making decisions can produce tangible benefits for the company, as well as motivate workers (Schaltegger et al., 2006). Brown et al. (2009) suggest that internal preparation of sustainability reports requires significant time and energy, but often yields worthy information.

2.5.1 Report Verification

Since the majority of sustainability reporting is voluntary, companies can choose which data to report and what formats to follow (Hahn and Kuhnen, 2013). However, according to Brown et al. (2009), the ability to choose what to report and in what format challenges the legitimacy of the system. This lack of standardization is a significant issue for sustainability reporting programs (Brown et al., 2009; Epstein, 2008; Herzig and Schaltegger, 2011). It can erode confidence in companies' data and present credibility issues for the reporting process.

When companies publish sustainability reports it is critical that they understand they are building long-term relationships with their stakeholders and focus on establishing trust and legitimacy. To accomplish this, firms must report both good and bad news (Epstein, 2008). Schaltegger et al. (2006) argues that firms frequently present only good information and results, and Daub (2007) notes that all environmental information in annual reports appears to be positive. This one-sided presentation can reduce the company's credibility with stakeholders and the general public. One of the most important methods to increase legitimacy is through report verification.

Report verification by external third parties is a critical step in sustainability reporting to ensure accurate data and content. In addition, verification and assurance are essential to provide legitimacy to the sustainability reporting process (Epstein, 2008; Herzig and Schaltegger, 2011; Orsato, 2009; Schaltegger et al., 2006). In addition to securing legitimacy, there are several other benefits to report verification. These range from marketing to risk management, checking systems against current laws, company standardization, and providing feedback for continuous improvement (Epstein, 2008).

Most sustainability verifications (60%) are completed by large accounting firms (Epstein, 2008). These companies frequently model the certification based on financial practices (Brown et al., 2009). In 2005, according to Epstein (2008), approximately 30% of Fortune Global 250 company sustainability reports were verified. Research indicates that European companies are more likely to verify

their reports. For example, Brown et al. (2009) noted that 45% of reports in Europe were verified, while only 3% of U.S. companies utilized external assurance systems. Herzig and Schaltegger (2011) reported similar results. Of the 100 largest global companies, comprising 22 countries, approximately 45% issued a sustainability report. Of these, an estimated 39% were verified. However, for U.S. companies the number of verified reports drops to 14%.

In most cases, corporate environmental sustainability initiatives and associated verification of reports are voluntary. To date, governments have not intervened in the process (Brown et al., 2009; Herzig and Schaltegger, 2011). A few exceptions have been noted, mostly in Europe. Since there are no international reporting standards and few regulations require comprehensive sustainability reporting, auditing and verifying sustainability performance and reports is difficult. Current verification and auditing schemes can include interviewing employees, relying on external experts, evaluating processes, and confirming key metrics (Epstein, 2008).

According to Orsato (2009), corporations that choose to self-verify without a sufficient auditing process may risk challenges from their stakeholders. One of the primary concerns regarding verification is the company's ability to influence control over the auditing process (Herzig and Schaltegger, 2011). To address this, a number of options exist with regard to verification and assurance processes. Verification can be conducted by NGOs, independent third parties, and accounting firms. However, the existence of too many assurance organizations

also challenges the notion of standardization (Brown et al., 2009). Schaltegger et al. (2006) and others argue that assurance systems are already in place for financial reports and could provide a framework for sustainability reporting verification. Schaltegger et al. (2006) also introduce the concept of a "challenger report" (p. 314). The purpose of the challenger report is to provide constructive feedback and identify potential opportunities to improve sustainability programs. The challenger report can be completed by an independent expert and can increase the credibility of the sustainability initiatives and reporting. In future reports, firms can reference the collaboration with an independent expert to improve the legitimacy of their program (Schaltegger et al., 2006).

2.6 Sustainability Indicators and Metrics

Sustainability metrics, such as energy consumption or GHG emissions, are indicators that allow a company to measure their environmental impact over a period of time (Schwarz, Beloff and Beaver, 2002) and convey data to intended audiences (Marshall and Brown, 2003). The terms metric and indicator are used interchangeably throughout the literature and in this thesis.

Gunasekaran and Spalanzani (2012) posit that metrics are critical for implementing and maintaining successful sustainability programs and provide opportunities to evaluate alternative initiatives. The authors maintain that metrics are necessary for robust and long-term programs. Jacobsen (2011) also agrees that indicators must be attached to every sustainability initiative. These indicators

provide quantitative data on the company's sustainability programs and along with qualitative information offer a detailed picture of the firm's environmental and social performance (Roca and Searcy, 2012).

One of the primary purposes of environmental metrics and indicators is to facilitate benchmarking[5]. Benchmarking allows companies to establish baselines and monitor their internal progress over time, as well as enables firms to compare themselves with other organizations or against an industry standard (Epstein, 2008). The purpose of benchmarking is to demonstrate improvements and identify whether previous goals were met. The process can also be utilized internally to compare different sectors or divisions of the company (Herzig and Schaltegger, 2011). This could help highlight more efficient facilities within an organization or identify opportunities for lower-performing establishments.

In order to successfully benchmark, sustainability metrics must be standardized. Companies must select appropriate indicators and commit to measuring the same metrics over a long period of time. Organizations frequently change their report format from year to year (Herzig and Schaltegger, 2011) and may alter their metrics, which makes benchmarking difficult.

Several studies have been conducted to quantify and evaluate sustainability metrics. For example, Roca and Searcy (2012) conducted an analysis of the 2008

[5] Note that a full discussion of benchmarking is outside the scope of this thesis.

sustainability reports of 94 Canadian companies. The study included companies from ten industrial sectors, including mining, oil and gas, banks, forestry, and steel, among others. Their goal was to summarize and compare terminology and sustainability initiatives among these organizations. The authors subsequently identified 585 metrics among the sampled firms (Roca and Searcy, 2012). Interestingly, there was little repetition of indicators in the sustainability reports. For example, 324 of the metrics were used only once within the reports, 91 were included twice, and 40 were mentioned in three of the reports (Roca and Searcy, 2012). These results indicated a significant lack of standardization among the published reports. Indeed, one of the most fundamental critiques of current sustainability reporting is the lack of standardized metrics across organizations (Brown et al., 2009). According to Roca and Searcy (2012), additional research is needed to understand the types of indicators published in sustainability reports in order to move towards standardizing metrics.

2.7 Voluntary Standards, Guidelines, Codes of Conduct, and Disclosure Websites

Sustainability reporting can be manifested in a variety of ways. In most cases, firms decide on their own metrics, programs, and report content. However, several voluntary standards, guidelines, codes of conduct, and disclosure websites exist which can strengthen the company's claims of sustainability and guide their reporting programs. Details regarding some of the most prominent programs are discussed below. These are also summarized in Table 1.

Table 1 – Summary of Sustainability Reporting Organizations

Organization	Type of Reporting	Worldwide No. of Participants
ISO 14001	Voluntary Standard	285,844
The Climate Registry		300
Global Reporting Initiative	Guideline	6,123
Corporate Register	Disclosure Website	11,215
Carbon Disclosure Project		4,112
The Ceres Principles	Code of Conduct	63

Source: ThomasNet (2013), Corporate Register (2014), GRI (2014), CDP (2014), The Climate Registry (2014), and The Ceres Principles (2014)

Although the terms voluntary standards, guidelines, and codes of conduct may sometimes be used interchangeably, there are subtle differences worth noting. According to Herzig and Schaltegger (2011), voluntary standards are provided by standardization bodies, governments, or NGOs. The International Organization of Standardization is one of the most prominent certifying bodies. Standards often require annual recertification. Guidelines are non-binding and represent an opportunity to demonstrate a firm's commitment to sustainability. They are also published by governments or NGOs. Guidelines are often based on experience and can preempt standards or regulations (Herzig and Schaltegger, 2011). The GRI is one of the most well recognized guidelines in sustainability reporting. Codes of conduct present opportunities for organizations to voluntarily commit to

acts that go beyond regulations (Ceres, 2014). They are established by organizations that share similar values and typically outline acceptable behaviors.

2.7.1 Voluntary Standards

Two of the most prominent voluntary standards in sustainability are the ISO 14001 and AccountAbility AA1000. The Climate Registry also publishes voluntary standards related to GHG emission reporting for businesses and governments. Companies frequently reference The Climate Registry when describing their GHG emission accounting processes. Following is a brief description of each of these voluntary standards used in sustainability reporting.

The ISO 14001 voluntary standard is an important environmental management tool and is referenced throughout the sustainability reporting literature (Daub, 2007; Jacobsen, 2011; Orsato, 2009). Companies are increasingly becoming ISO-certified since it has become one of the principal international environmental voluntary standards (Daub, 2007). According to the ISO website, the voluntary standard provides guidance for implementing environmental programs within a company or organization.

Rather than mandating specific requirements for a management system, the ISO 14001 voluntary standard solely provides guidance and direction (ISO, 2014) for the company to choose their own systems. A critical component of the program is to establish goals, determine appropriate metrics, and monitor progress towards those objectives. The goal of ISO 14001 is to provide criteria that will reduce

environmental impacts and present a long-term vision for the future (Jacobsen, 2011). The ISO 14001 voluntary standard requires audits of the firm's environmental management systems, and ISO provides general guidance on performing an audit, including auditor qualifications.

A detailed framework for verifying GHG emissions was added to the ISO 14001 voluntary standard in 2006 (Epstein, 2008). According to Epstein (2008), the intent of the GHG verification system was to support standardization of monitoring and reporting among organizations and to improve the reliability of results.

Orsato (2009) explains that the benefit of the ISO 14001 certification can be two-fold. The certification can provide a competitive advantage over rival organizations that do not have the standard, but it can also expose weaknesses in facility operations. The identification of these issues can ultimately improve the company's bottom line by reducing inefficiencies and waste.

Orsato (2009) believes that the ISO 14001 certification might have more implications for business-to-business transactions than for consumer-facing dealings. He points out that the standard has tangible value to suppliers. For example, more and more large corporations, such as Ford and General Motors, are requiring suppliers to obtain the certification in order to continue business with their organizations. According to Orsato (2009), these larger client corporations prefer their suppliers obtain the ISO certification because it signals they operate

under similar best management practices. However, he also challenges whether ISO 14001 certification is important to the end consumer. As with other sustainability reporting initiatives, companies that are most visible to the public and/or utilize significant natural resources have the most to gain from the ISO certification (Orsato, 2009).

The AccountAbility AA100 standard is also an important sustainability reporting instrument. It was established in 2003 (Epstein, 2008) by the organization AccountAbility and provides one of the most frequently referenced standards in the sustainability reporting literature (see Brown et al., 2009; Epstein, 2008; Herzig and Schaltegger, 2011; Wales, 2010). The AA1000 standard provides assurance based on materiality, completeness, and responsiveness (Epstein, 2008). Epstein (2008) also points out that the AA1000 standard is useful to determine sustainability goals, identify metrics, and report on progress towards achieving those objectives. Embedded in the AA1000 standard is also an aspect of continuous improvement. This is completed by an increasing level of verification and a required discussion of how the company will meet its more stringent goals over time (Epstein, 2008).

Lastly, the non-profit Climate Registry provides standards for companies to conduct GHG reporting. This includes the calculation and validation of GHG emissions, as well as reporting. The purpose of the Climate Registry is to support reduction of GHG emissions from businesses and governments, as well as provide a one-stop repository for reporting (Climate Registry, 2014).

2.7.2 Guidelines

The most common global framework for sustainability reporting is the GRI (Brown et al., 2009; Hahn and Kuhnen, 2013; Roca and Searcy, 2012; Schaltegger et al., 2006). Although technically a guideline, the GRI is considered the *de-facto* standard for sustainability reporting worldwide (Hahn and Kuhnen, 2013; Herzig and Schaltegger, 2011).

The GRI was established in 1997 through a partnership with the Coalition for Environmentally Responsible Economies (Ceres) and the UNEP (Epstein, 2008; Orsato, 2009). The original GRI guidelines were subsequently published in 1999 (Hahn and Kuhnen, 2013) and 2000 (Epstein, 2008) and have since undergone multiple revisions. According to Orsato (2009), the GRI is an independent international organization that focuses on improving and expanding the use of the GRI guidelines. The organization, currently headquartered in Amsterdam, relies on input from a variety of stakeholders to drive and support its mission (Orsato, 2009).

The primary purpose for developing and implementing the GRI was to provide a single, standardized system to condense the multiple sustainability reporting formats existing at the time. The intent was to develop a unified system that would facilitate benchmarking and allow companies and other organizations to compare or rank themselves (Brown et al., 2009). The secondary intent was to

create an environment for discussion and discourse regarding the many sustainability initiatives undertaken by organizations (Brown et al., 2009).

There are mixed reviews regarding the efficacy of the GRI reporting process. For example, Brown et al. (2009) suggests that the GRI has not provided the standardization necessary for reporting that allows companies to compare themselves and has not resulted in sufficient data quality (Brown et al., 2009). Although the intention of the GRI was to standardize reporting, companies still prepare significantly different reports. Additionally, large companies not only comprise the majority of reporters, but they are mostly responsible for the oversight and advancement of the GRI guidelines (Brown et al., 2009). Small and medium-sized companies do not have a strong presence in the GRI system.

The GRI can be credited with increasing discussions surrounding corporate sustainability, a key mission of the founder (Brown et al., 2009). It would be difficult to completely dismiss the GRI as ineffective. Herzig and Schaltegger (2011) maintain that the GRI has been credited with streamlining reporting systems, and Brown et al. (2009) contend that within a short amount of time the GRI has been an effective reporting tool on many different levels.

2.7.3 Codes of Conduct

The Ceres Principles represent one of the first established means for sustainability reporting (Epstein, 2008), and is known as an environmental code of conduct. The non-profit 501(c)(3) Ceres was established in 1989 following the Exxon

Valdez oil spill. According to their website, the Ceres Principles include ten doctrines to be endorsed by the company. They include "sustainable use of natural resources", "reduction and disposal of wastes", and "energy conservation", among others (Ceres, 2014). In addition, companies subscribing to the Ceres Principles were required to report on their environmental programs on an annual basis (Orsato, 2009). According to Epstein (2008), the intent of the Ceres Principles was to develop a standardized method of collecting and sharing information. Ceres was specifically designed to provide information to the socially responsible investment community. Ceres and the UNEP subsequently headed the formation of the GRI (Epstein, 2008).

2.7.4 Disclosure Websites

In addition to adhering to standards, guidelines, and codes of conduct, organizations can utilize web-based disclosure outlets to convey their sustainability programs. Two of the most prominent websites include the Corporate Register and the CDP.

The Corporate Register is a private organization that provides one of the largest sources of published sustainability reports. Reports can be collected by the Corporate Register or provided by reporting companies. The online service provides access to recent and archived company reports. Most of the information is available on their website at no charge. Other services include benchmarking, profiling, and announcement of published reports. The intent of the Corporate

Register is to provide a centralized location for all sustainability reports and to promote corporate responsibility on an international scale (Corporate Register, 2014).

The CDP is an international non-profit organization developed to allow companies and municipalities to report critical environmental data to the public (CDP, 2014). The CDP makes requests to the largest global companies to share information on their GHG emissions, energy use, and climate change activities (CDP, 2014). The complete database is provided for use by all stakeholders, including investors and municipalities. For example, investors can use the information to minimize risks related to investments, and cities can identify opportunities to create more resilient communities.

2.8 Summary

Sustainability reporting provides opportunities for organizations to demonstrate commitment to environmental and social initiatives. Recent trends indicate a significant increase in the number of reporting organizations, mostly among larger corporations. For example, a 2004 report by UNEP/SustainAbility calculated a 600% increase in sustainability reporting in less than a decade (Stubbs et al., 2013).

According to the literature, there is a wide variety of detail and complexity in sustainability programs and reporting formats. Determining what to report can be accomplished through the process of a materiality assessment. Materiality can

help identify opportunities to add value to the organization and address those concerns most important to stakeholders. One of the most critical components of sustainability reporting is the selection of appropriate metrics. Metrics allow an organization to benchmark or measure their environmental performance over time (Schwarz et al., 2002), convey data to stakeholders (Marshall and Brown, 2003), and evaluate alternative initiatives and programs.

Companies can produce stand-alone reports, as well as provide sustainability-related data in their annual reports. Reporting guidelines, such as the GRI, can influence the content of these reports and also provide standardization. Upon preparation of sustainability reports, independent verification should be considered to add legitimacy to the process (Epstein, 2008; Herzig and Schaltegger, 2011; Orsato, 2009; Schaltegger et al., 2006).

In addition to the GRI, there are several other standards, guidelines, and codes of conduct companies can utilize to guide their sustainability reporting program. These include ISO 14001, the Climate Registry, and the Ceres Principles, among others. Websites, such as the Corporate Register and the CDP, assist companies with the public disclosure of data and reports.

Chapter 3: Methods

The goal of this research was to quantify the number of large New England manufacturers preparing sustainability reports, summarize the report formats, analyze the environmental metrics presented in the reports, document the number of verified reports and organizations, and describe how the reporting format and depth varied by state, company size, sales volume, and the firm's visibility in the marketplace.

The companies used in this analysis were selected using LexisNexis Academic, an online database which allows users to sort businesses by state. The analysis included a search of all of New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), and was limited to a subset of companies headquartered within these locations. The analysis includes only the manufacturing sector. The North American Industry Classification System (NAICS) codes 31 through 33 comprise the entire manufacturing industry and were selected using the LexisNexis Academic database (U.S. Census, 2014).

The original intent of this project was to evaluate the top 10 manufacturers from each of the New England states. However, after applying the search criteria described above, four of the states (Maine, New Hampshire, Rhode Island, and Vermont) had fewer than 10 companies in their respective state. The results for the number of manufacturers headquartered in each state, as provided by LexisNexis Academic are presented in Table 2 below.

Table 2 - Summary of Manufacturers by State

State	No. of Manufacturers Headquartered in State
Connecticut	53
Maine	3
Massachusetts	136
New Hampshire	6
Rhode Island	8
Vermont	3

Source: LexisNexis Academic 2014

Based on these results, all of the companies located in Maine, New Hampshire, Rhode Island, and Vermont were selected for analysis. The largest 15 companies from Connecticut and Massachusetts were also chosen, based on the number of employees.

3.1 Content Analysis

Content analysis is an empirical process of formulating results from data, material, and other related texts (Krippendorff, 2004). According to Krippendorff (2004), the results of a study must be replicable in order to be valid. Specifically, data should provide the same conclusion regardless of the analyst.

After the companies were selected for analysis, an online search was conducted to establish whether the organizations reported their sustainability initiatives and to understand the scope of the programs. The online search included company websites, the independent organization the Corporate Register, the non-profits the

CDP, the GRI, the Climate Registry, and Ceres, the International Organization for Standardization, the CEO-led organization the World Business Council for Sustainable Development, and government sources such as the SEC and the U.S. Environmental Protection Agency.

Content analysis was then utilized to review the type of sustainability reports produced (i.e. stand-alone report or portion of the annual report), the metrics and indicators used to monitor environmental impacts, and the number of certified businesses and reports (i.e. GRI or ISO 14001-certified). The data variables included in the analysis are summarized in Table 3 below.

Table 3 - Summary of Data Variables

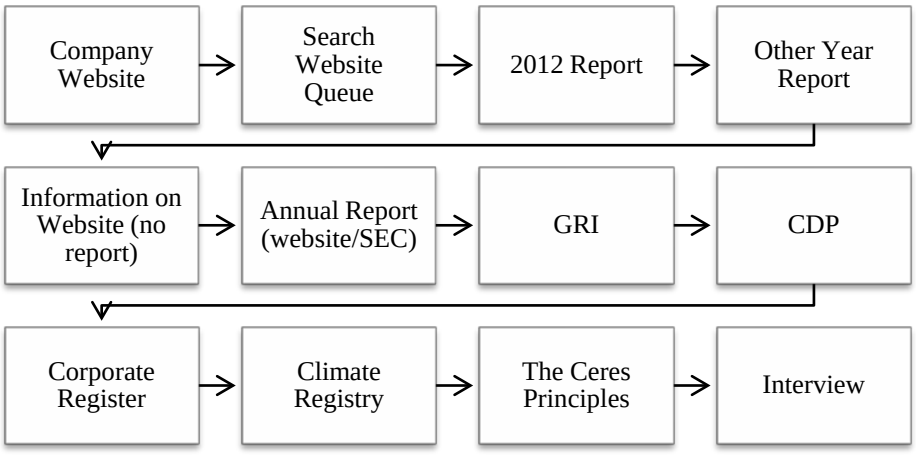
Variable	Description
Sustainability report	Availability of sustainability report
Sustainability (website)	Sustainability data available on the company website
Year	Year of publication
No. of pages	No. of pages in sustainability report
Name of report	Title
Environmental metrics	Environmental metrics provided in the report
GRI Website	Report available on the GRI website
GRI self-declared	Report self-declared (i.e. no external verification)
GRI-checked	Report verified by the GRI
GRI guidelines	Guidelines used in the report (i.e. G3 or G3.1)
GRI application level	Self-rated GRI report (i.e. A, B or C)
Verified report	Report verified by external party
Carbon Disclosure Project	Company provides information to the CDP
Corporate Register	Report available on the Corporate Register website
The Climate Registry	Company provides information to the Climate Registry
The Ceres Principles	Company adheres to the Ceres Principles
ISO 14001	Company is ISO 14001-certified
WBCSD	Report available on the World Business Council for Sustainable Development website
S&P 100	Listed on the S&P 100 stock index
S&P 500	Listed on the S&P 500 stock index
B2B	Conducts business-to-business sales
B2C	Conducts business-to-consumer sales
Report location	Location of sustainability report
Example of sustainability initiative only	Company provides example of sustainability initiative, but does not provide complete sustainability report

The original intent of the analysis was to limit the review to 2012 sustainability reports. This would establish a baseline for comparing programs and initiatives across all of the companies. However, since several of the companies did not prepare 2012 sustainability reports, other versions were considered and subsequently included in the analysis. As described in Chapter 4, Results, reports

spanned from 2010 to 2013. Although the majority of the reports are dated 2012, the purpose of including the additional reports was to provide a more complete data set for the analysis. As proposed, the study also included sustainability information posted on the company's website, even if it was not provided in a report format.

If sustainability data was not readily available on the company website, search tools were utilized to ensure adequate due diligence during the report identification and collection phase. If website search tools were available, the terms "sustainability" and "environment" were entered into the queue. In addition, SEC annual 10-K forms were obtained and a similar search was conducted using Adobe pdf formats. A flow chart depicting the data collection process is provided as Figure 1 below.

Figure 1- Data Collection Process Flow Chart



After reviewing the sustainability reports and company websites, the metrics and indicators were recorded, as well as the specific certifications obtained by the

business. It was also noted whether the report was verified by a third party. The results of the analysis are presented in Chapter 4, Results.

3.2 Interviews

In addition to the content analysis, interviews were conducted to ensure thorough data collection and provide additional insight to the research. According to the IRB office, no approval or exemption status was necessary based on the type of questions proposed for the interview. Companies that did not have information regarding sustainability programs on their websites or other public sources were identified for interviews.

Selected companies were contacted and an appropriate representative, such as a compliance or sustainability officer or health and safety professional was requested for interview. In some cases, correspondence was also conducted via email. The primary purpose of the interviews was to confirm that sustainability reporting data was not available for the specific organization. The secondary intent was to discuss whether the company had internal sustainability programs or if they would consider reporting in the future. If the company did not have any sustainability programs, the purpose of the interviews was to discuss whether stakeholders were asking for these initiatives and to identify obstacles that might be preventing the start-up of such programs. Based on the potentially sensitive nature of the discussions, it was decided that the companies and individuals involved in the interviews would remain anonymous. A complete copy of the company questionnaire is provided in Appendix A.

Both the content analysis and company interviews provided important information regarding the types of sustainability initiatives existing among the sampled New England manufacturers, the number of certified businesses and reports, the metrics and indicators utilized, the scale of adoption, and insight into companies without sustainability reporting programs. The results of the content analysis and interviews are included in Chapter 4, Results.

Chapter 4: Results

As described in the Methods, a total of 50 New England manufacturers were originally identified for analysis. During the content analysis, it was necessary to make a few changes to the sample of companies involved in the study. For example, one of the organizations originally identified as headquartered in Maine was actually a Canadian-based company. Therefore, the company was not included in the analysis. In addition, three organizations (one each from Massachusetts, Rhode Island, and Vermont) had been subsequently purchased by another company and were removed from the analysis. To maintain a total of 15 organizations from Massachusetts, the next largest company (based on the number of employees) was selected using the LexisNexis database. According to LexisNexis, there were 136 manufacturers headquartered in Massachusetts at the time of the study. Since all of the manufacturers from Rhode Island and Vermont were already included in this analysis, no other potential companies could be added to replace the two firms removed from the analysis. After these considerations, a total of 47 companies were included in the study. The total number of organizations analyzed by state is provided in Table 4 below.

Table 4 - Number of Manufacturers Analyzed by State

State	No. of Manufacturers
Connecticut	15
Maine	2
Massachusetts	15
New Hampshire	6
Rhode Island	7
Vermont	2
Total	**47**

4.1 Reporting Companies by State

As described in detail below, the company's size and sales revenue were relevant to participation in sustainability reporting for the sample of large New England manufacturers. Following is a state-by-state description of company profiles and the number of organizations reporting their environmental initiatives. Table 5 summarizes the median sales and number of employees for manufacturers by state, as well as the number and percentage of companies preparing sustainability reports.

Table 5 - Summary of Company Characteristics and Reporting by State

State	Median Sales (USD)	Median No. Employees	No. Reporting	% Reporting
Connecticut	4,292,065,000	14,300	8	53
Massachusetts	2,701,142,000	6,850	12	80
Vermont	1,932,249,000	2,965	2	100
Maine	649,363,970	2,713	0	0
Rhode Island	180,508,000	1,030	2	29
New Hampshire	21,089,500	139	0	0
Total	**2,400,000,000**	**5,900**	**24**	**51**

Source: LexisNexis Academic 2014

The median sales revenue of the sample companies headquartered in Connecticut was over $4.2 billion and the median number of employees was 14,300, which is the highest of the New England states. Based on the analysis, approximately 53% of the study companies in Connecticut produced sustainability reports. The Massachusetts sample companies had the second highest median sales revenue and number of employees by state with approximately $2.7 billion in sales and 6,850 employees. Approximately 80% of the sample companies headquartered in Massachusetts produced sustainability reports. Both of the sample companies from Vermont participated in sustainability reporting. One organization had sales revenue of $3.8 billion and had 5,800 employees. The other company had sales revenue of $5.3 million and had 130 employees.

None of the sample companies headquartered in Maine participated in sustainability reporting. One organization had sales revenue of $1.3 billion and had 5,400 employees. The other sample company had sales revenue of $5.4 million and had 25 employees. Approximately 29% of the sample companies headquartered in Rhode Island produced sustainability reports. The median sales revenue was $180,508,000 and the median number of employees was 1,030. Three sample organizations had sales over $1 billion and four companies had greater than 1,000 employees.

None of the sample companies headquartered in New Hampshire produced sustainability reports. All six of the sample companies had annual sales of less than $1 billion each. The median sales revenue in New Hampshire was $21.1 million. Two of the New Hampshire sample companies had greater than 1,000 employees. The median number of employees was 139.

In summary, based on the content analysis, a total of 24 sample companies (approximately 51% of all companies) prepared publicly-available sustainability reports. In addition to the reporting companies, an additional seven organizations (approximately 15% of all companies) provided an example of a sustainability initiative undertaken by their companies either on their website or in their annual report. The initiatives provided examples of how the company was accomplishing a specific sustainability goal, such as the amount of energy saved from installing LED lighting. However, aside from the specific initiative, no

other metrics or indicators were located for these seven organizations and no sustainability report was provided.

Companies in Connecticut, Massachusetts, and Vermont produced the majority of the sustainability reports (approximately 92%) in this analysis. Companies in these states also had the greatest median sales revenue and the highest number of employees. The median sales revenue among study companies in all of these three states was over $1 billion and the median number of employees was greater than 1,000. The companies with the least amount of reporting (Maine, New Hampshire, and Rhode Island) all had median sales revenue below $1 billion. Note that none of the study companies in Maine or New Hampshire prepared sustainability reports.

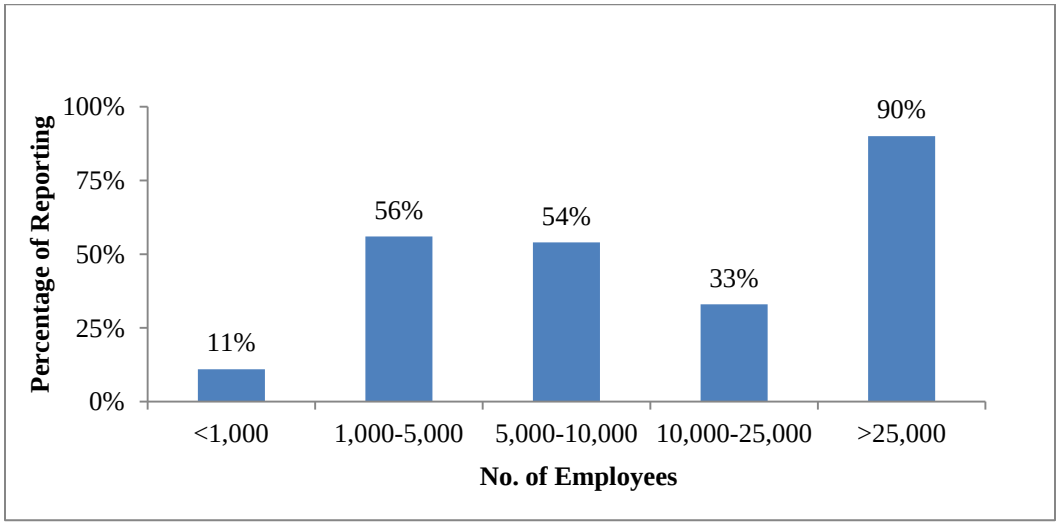
4.2 Reporting Company Statistics

4.2.1 Company Size

Companies in this analysis ranged in size from 2 to 212,000 employees. The median size was 5,900 employees. With the exception of one company, only organizations with greater than 1,000 employees produced a sustainability report. The single reporting company with fewer than 1,000 employees was a small Vermont-based business-to-consumer (B2C) organization, Seventh Generation. Based on their website and stated mission to consider the next seven generations, sustainability could be considered critical to their brand and identity. A figure

indicating the percentage of reporting companies based on the number of employees is included in Figure 2 below.

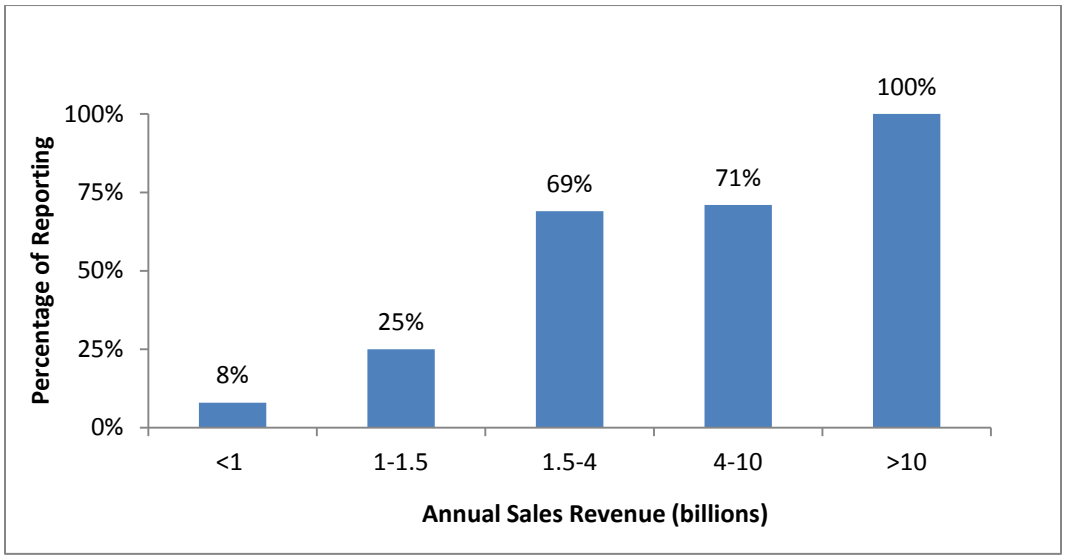
Figure 2- Reporting by No. of Employees



4.2.2 Revenue

Annual sales revenue ranged from $42,254 to $57.7 billion. The median was $2.4 billion. All seven companies with annual revenue greater than $10 billion produced sustainability reports. Approximately 68% of the companies with annual revenue greater than $1 billion produced sustainability reports. Alternatively, thirteen organizations had less than $1 billion in annual revenue. Of these companies, only one (Seventh Generation) produced a sustainability report. A figure displaying the percentage of reporting companies based on 2012 annual sales revenue is included as Figure 3 below.

Figure 3 - Reporting by Annual Revenue



4.2.3 Stock Indices

Seventeen of the organizations in this analysis were part of the Standard and Poor's (S&P) 500 stock market index. Three of these companies were also part of the S&P 100. All of the S&P 100 companies produced sustainability reports. Sixteen of the seventeen companies (approximately 94%) listed on the S&P 500 produced sustainability reports. The number of reporting companies in this analysis is well above average for S&P 500 listed firms, which was only 53% in 2012 (Governance and Accountability Institute, 2014). However, it is important to note that this analysis only includes manufacturers, and the S&P 100 and 500 indices include companies from all industries.

4.2.4 Business to Business vs. Business to Consumer

The majority of the companies in this analysis (approximately 77%) could be described as business-to-business (B2B) firms. These organizations sell products and services to other companies. Approximately 15% are B2C and market goods and services directly to consumers. The remaining 8% could be considered both B2B and B2C. Companies were identified as B2B or B2C based on a review of their website and the products and services provided by the organization. Of the B2C firms, approximately 71% produced sustainability reports. Of the B2B companies, approximately 50% produced sustainability reports. Of the companies identified as both B2B and B2C, approximately 50% produced sustainability reports.

4.3 Report Characteristics

The majority of the reports (approximately 92%) were stand-alone sustainability reports. Only two of the documents were combined annual and sustainability reports. In one case, a company provided both a "Report on Global Citizenship" and an "Environment, Health and Safety Report". Relevant data for this project was obtained from both of these documents. The titles and names of the sustainability reports varied among corporations. A list of the report titles is provided in Table 6 below. Reports ranged from three to 147 pages in length. The median length was 75 pages. A total of 16 reports were dated 2012. Seven of the reports were utilized from other years, ranging from 2010 to 2013. The reports for these years were utilized only when a 2012 version was not available.

One company provided 2012 data and metrics on their website, but did not produce a report.

Table 6 - Summary of Report Titles

Report Title	No. of Reports
Sustainability Report	8
Corporate Responsibility Report	4
Corporate Social Responsibility Report	2
Corporate Citizenship Report	2
Corporate Social Responsibility Annual Report	1
Annual Report	1
Corporate Consciousness Report	1
Global Sustainability Report	1
Annual Report Financial and Corporate Responsibility Performance	1
Report on Global Citizenship, Environment, Health and Safety Report	1
Sustainable Development Report	1

4.4 Reporting Venues and Certifications

Content analysis was utilized to identify the most prominent reporting venues for sustainability programs, as well as the percent of certified reports. Based on this analysis, the most commonly used websites were the Corporate Register, the GRI, and the CDP. A summary of these findings is provided in Table 7 below. Of the 24 sustainability reports found in this analysis, the majority (approximately 92%) could be located on the Corporate Register website.

Approximately 75% of the reporting organizations in this analysis utilized the GRI website as a reporting venue at one point in time. The availability of reports was not always consistent from year to year. Approximately 54% of the reporting

organizations utilized the CDP website as a tool to report their sustainability metrics and data, and approximately 8% subscribed to the Ceres Principles. Of the 24 reports analyzed, 33% were verified by the GRI or other third-party certifying organization.

In addition to evaluating sustainability reporting venues, this analysis considered the extent of ISO 14001-certified organizations. A total of 32% of the organizations included in this analysis were ISO 14001-certified. In some cases, only a limited number of facilities were certified within an organization. However, for this analysis companies were considered ISO-certified if any of their facilities had obtained the certification.

Table 7 - Summary of Reporting Venues and Certifications

Reporting Platform/Certification	No. of Companies	% of Companies
Corporate Register	22	92
Global Reporting Initiative	18	75
Carbon Disclosure Project	13	54
ISO 14001	15	32[6]
The Ceres Principles	2	8
The Climate Registry	0	0

[6] Note that 32% of all 47 companies analyzed were ISO 14001-certified. The remaining percentages in Table 7 are based on the number of reporting organizations in the study. In this analysis, there were 24 organizations that prepared a sustainability report.

4.5 Metrics

Based on the content analysis, a total of 139 environmental metrics and indicators were identified in the reviewed sustainability reports. Of these, a total of 66 were used in only one report, and 22 indicators were found in only two documents. A complete list of the metrics and the number of times used in the sustainability reports is included in Appendix B. Of the 139 metrics, a total of 31 were GRI-specific indicators. Metrics that were identified in at least ten sustainability reports are summarized in Table 8 below. Of these 11 most commonly used metrics, five are GRI indicators from the GRI Guidelines.

Table 8 - Summary of Top Environmental Metrics

Environmental Metric	GRI Index	No. of Reports	% of Reports
Total GHG emissions by weight	EN16	17	71
Total water use		13	54
Scope 1 GHG emissions		11	46
Scope 2 GHG emissions		11	46
Solid waste recycled		11	46
Total energy consumption		10	42
Energy intensity		10	42
Direct energy consumption by primary source	EN3	10	42
Indirect energy consumption by primary source	EN4	10	42
Energy saved due to conservation and efficiencies	EN5	10	42
Initiatives to mitigate environmental impact of products and services, extent of mitigation	EN26	10	42

As shown in Table 8, GHG emission reporting is the most common metric among the reviewed sustainability reports and appears in approximately 71% of reports.

Total water use is the second most frequently-used environmental indicator and was found in approximately 54% of the reports. Scope 1 and 2 emissions and solid waste recycled are utilized in almost half of the reports (approximately 46%), and the remaining six indicators appear in approximately 42% of the reports.[7]

4.6 Interviews

Based on the results of the content analysis, a total of 23 companies were identified for phone interviews due to the absence of web-based information. This represented approximately 49% of all of the companies included in this study. The companies were contacted to determine if they had sustainability programs or reporting systems in place, or were considering implementing these initiatives in the future. The information was also used to add depth of understanding surrounding the lack of sustainability reporting among the largest New England manufacturers. The interviews were conducted between May 28 and August 5, 2014.

A total of three attempts were made to speak with appropriate representatives who could discuss sustainability initiatives within their organizations. A combination of email and phone calls were utilized to locate the representatives. The response rate for the request for information regarding the company's sustainability

[7] Note that these percentages are based on the number of reporting organizations, not the entire sample population.

programs was approximately 65%. This included information provided by the receptionist, sales staff, and facilities personnel, among others. Five in-depth interviews were conducted with environmental professionals within the organizations.

4.6.1 Sustainability Initiatives

Of the interviewed companies that provided information, approximately 33% had some form of sustainability initiative in place. In most cases, however, the company did not officially consider the activity a sustainability initiative. The activities were completed simply because they saved money or were considered an industry standard. As explained by one interviewee, there was no company-wide mandate to implement sustainability programs. The initiatives included recycling, minimization and proper disposal of waste, utilization of environmentally friendly materials for manufacturing, reduction of waste transported to landfills, and continuous improvement processes related to environmental management systems.

4.6.2 Reasons for Not Implementing Sustainability Programs

When asked if the company lacked resources to implement a sustainability program, one interviewee responded that it was not a question of resources, it was a lack of a dedicated role or responsibility. He further noted that there was no incentive for an employee to take on additional responsibilities outside his or her assigned role. The majority of the companies interviewed were B2B

organizations. Several interviewees pointed out that sustainability appeared to be more important for B2C companies, where products were directly marketed to the end consumer. Furthermore, one of the interviewees suggested that larger companies (unlike his business) were more likely to have sustainability programs since they encountered more pressure from stakeholders.

Two of the companies shared that they were much more concerned about financial stability and performance than sustainability programs, and one of these specifically pointed out that their investors were only interested in financial performance.

4.6.3 Future Sustainability Programs

Two of the organizations indicated that they were currently working on instituting a sustainability program within their organization. A third company reported that they were taking a close look at their green initiatives currently underway and evaluating how they might fit into a sustainability program. This interviewee indicated that the company was planning to start meeting this year to consider where they were currently, and where they want to be in the future. The company stated that they do not want to implement sustainability programs simply because everybody else is doing it. That being said, the company was looking to start recording and reporting data internally to help evaluate where they were with compliance and sustainability initiatives. A fourth company was in the process of looking at their long-term strategic goals and would consider whether sustainability fit into their business plan.

4.6.4 Sustainability Reporting

Based on the outcome of the interviews, only one company participated in sustainability reporting. The firm provided responses to the CDP however they did not prepare a sustainability report. In addition, five of the companies interviewed provided an example of a sustainability initiative on their website or in the annual report. Of the companies interviewed, one indicated that they will be reporting sustainability data in the future, and that they were considering using the GRI or CDP as a reporting platform. Another organization indicated that it reported data to an industry-specific organization. However, this information was not available to the public. Another organization reported that they were going to begin recording data internally to help them assess how their current green initiatives could be leveraged to create a sustainability program. A fourth firm mentioned that the level of reporting and transparency was to be determined, based on senior management and the direction of the CEO. A fifth company indicated that they were looking to expand the scope of their internal reporting across their various manufacturing locations. The firm was also working to evaluate and report on the environmental impact of activities that occurred upstream of their manufacturing operations. For example, the company was concerned with the impacts of transportation of raw materials to their manufacturing facility. Lastly, one interviewee indicated that their organization had no sustainability reporting planned for the future.

4.6.5 Stakeholders

During the interviews, there was lack of consensus on the importance of sustainability programs to investors. One company shared that their investors were only interested in financial performance. Another firm indicated that they have had investor inquiries regarding their sustainability program. Overall, there appeared to be at least some interest from stakeholders. One company mentioned that their European customers have been asking for their sustainability programs. One of the organizations provided materials and components to other firms within the supply chain. They indicated that they were receiving pressure from their clients, often larger companies, to implement sustainability programs within their organization. Specifically, their clients were looking for environmental management programs (such as ISO-certifications) and continuous improvement policies rather than explicit metrics or sustainability programs.

4.6.6 Regulatory Compliance

During the in-depth interviews, three of the four companies discussed that they were more focused on evaluating their regulatory compliance than implementing voluntary sustainability measures. The representatives indicated that their first responsibility was to ensure the company was in compliance with the law, including environmental health and safety regulations. In most cases, sustainability programs were considered beyond compliance initiatives to be considered only as additional time and resources permitted. One interviewee

pointed to the increasing regulations for sustainability programs in Europe. The representative indicated that some companies expect these regulations could also be implemented in the U.S.

4.6.7 Manufacturing and Contract Manufacturers

Approximately 42% of the companies contacted indicated that their manufacturing and production occurred overseas. Several interviewees noted the small number of staff located within their U.S. offices. In most cases, domestic staff was limited to financial, sales, and investor relations personnel. None of these organizations appeared to have an environmental group or related professional working within their company. When asked if they would consider pressuring their contract manufacturers to implement sustainability programs, one company responded that they were more concerned with sustaining their own company. The majority of interviewees were quick to suggest they had no ability to influence their contractors. Furthermore, since their production occurred overseas, these companies saw no reason to have an in-house sustainability program.

One organization indicated that it had decentralized operations, meaning that all of the smaller companies within the firm had a significant amount of autonomy. These smaller companies had the freedom to operate their businesses as they saw fit, including whether or not they adopted sustainability programs.

Chapter 5: Discussion and Recommendations

Sustainability and associated reporting of environmental and social indicators are increasing among corporations. Sustainability initiatives can provide opportunities for companies to become more efficient, use less resources, minimize environmental impacts, and increase competitiveness. Reporting provides an opportunity for companies to communicate these initiatives to stakeholders and the public, thereby improving reputation and branding.

Due to the value of the material published in sustainability reports and a desire to summarize and understand these documents, several studies (see Cowan, Dopart, Ferracini, Sahmel, Merryman, Gaffney and Paustenbach, 2010; Leszcynska, 2012; Marshall and Brown, 2003; Roca and Searcy, 2012) have been conducted of company reports. However, compared to the extensive literature on corporate sustainability reporting, empirical studies represent only a fraction of the available information. This thesis was completed to contribute to the comparatively limited number of empirical studies, and to investigate the prevalence of sustainability reporting among top New England manufacturers. This chapter provides a discussion of the findings, as well as several recommendations to increase the use of sustainability reporting. A table summarizing the recommendations is provided in Appendix C.

Previous studies mentioned above provide analysis of company reports on a national and international scale. However, this thesis drills down beyond the national scale to provide analysis of companies' sustainability initiatives at the

state and regional levels. In the future, additional research could drill down even further to the municipal level to understand what local companies are reporting with regards to environmental metrics.

Previous sustainability reporting research (see Cowan et al., 2010; Marshall and Brown, 2003; Roca and Searcy, 2012) is primarily limited to stand-alone reports. This research includes an analysis of annual reports, company websites, and numerous public disclosure databases, in addition to stand-alone reports. Only one other analysis identified during the literature review[8], collected reporting data from public databases.

During the review of the literature, several studies (see Gunasekaran and Spalanzani, 2010; Roca and Searcy, 2012) posited that additional research is needed to fully understand what companies are measuring and reporting. Based on the database of metrics included in this thesis, it is anticipated that this analysis will provide an understanding of topics material to corporations and will contribute to the research of sustainability indicators.

This thesis included analysis of 47 top manufacturers in New England. The manufacturing sector was selected due to its intense resource requirements, high energy and water demands, and potential for significant waste generation. Based on these assumptions, implementing sustainability initiatives within the

[8] The analysis was conducted by Leszczynska (2012) and included a review of unspecified databases.

manufacturing industry could provide additional means to protect natural resources and improve waste management systems, among other positive environmental benefits.

The results of the analysis indicated that 24 of the 47 manufacturers (approximately 51%) prepared sustainability reports between 2010 and 2013. An additional seven organizations (approximately 15%) provided examples of sustainability initiatives on their websites or in their annual reports without committing to a full reporting program. This last finding could indicate companies' awareness of the importance of sustainability reporting and may signal a commitment to full sustainability reporting programs in the future. In summary, organizations were at various stages of reporting, from providing examples of sustainability initiatives (such as installing LED lighting), to comprehensive sustainability programs with report verification and auditing systems. Based on these results, additional research could be conducted to understand how to encourage other New England manufacturers to measure and report environmental indicators.

Based on the literature, large, multinational corporations comprise the majority of reporting organizations (Marshall and Brown, 2003; Stubbs et al., 2013). This research is consistent with the literature in that 77% of reporters in this analysis were large business-to-business organizations. Specifically, the median sales revenue of the corporations was $2.4 billion and the number of employees was

5,900. With the exception of one company, all reporting organizations had annual sales revenue over $1 billion and employed more than 1,000 employees.

Based on these results, there is a clear need to consider alternatives to expand sustainability programs and reporting to small and medium-sized manufacturers in the New England region. Interviews and additional research could be conducted to understand challenges specifically facing small businesses and the adoption of sustainability reporting practices within these organizations. Information could also be collected to understand how information sharing might be utilized by companies to expand the process of reporting. For example, information sharing programs are utilized by municipalities and could provide a model for understanding sustainability initiatives underway at other organizations. The U.S. Conference of Mayors Climate Protection Center is an example of a successful organization that supports municipal leaders in their effort to reduce GHG emissions and provides opportunities for information sharing. Similar centers could be established to promote relationships between governments and corporations and could educate small business owners on the tools necessary for reporting, as well as the potential fiscal and branding opportunities of corporate sustainability reporting programs.

Approximately 36% of the New England companies included in this analysis were listed on the S&P 500 stock index. Of these, approximately 94% prepared sustainability reports. According to data provided by the Governance and Accountability Institute (2014), approximately 53% of all S&P 500 companies

prepared sustainability reports in 2012 (including all industry sectors). Based on this information, the number of New England-based S&P 500 manufacturers disclosing sustainability-related information is significantly greater than the overall S&P 500 index. Due to their intense use of resources and potential for generating large volumes of waste and emissions, large manufacturers are often heavily scrutinized by stakeholders and the general public. To address this issue, large manufacturers may seek to counter negative images by preparing sustainability reports to demonstrate their commitment to the environment. This could help explain the large discrepancy between the numbers of New England manufacturers reporting as compared to the overall S&P 500 index.

The New England states with the greatest percentage of sustainability reporting in this analysis included Vermont, Massachusetts, and Connecticut. Over half of the manufacturers sampled in each of these states published sustainability reports. Approximately one-third of the sampled companies in Rhode Island prepared sustainability reports, and none of the sampled businesses in Maine or New Hampshire published reports. As noted in the literature and corroborated with this research, the lack of sustainability reporting in these states may be related to the size and sales revenue of the manufacturers located in these states. This suggests that Maine and New Hampshire policy makers and government might facilitate reporting by partnering with businesses to provide opportunities for these companies to participate in sustainability reporting. This is especially true for small and medium-sized businesses that are mostly absent from reporting.

The majority of the sustainability reports in this analysis (approximately 92%) were stand-alone documents. Two reports were combined annual and sustainability reports. One organization provided sustainability data on their website in lieu of a stand-alone or annual report. The reports varied considerably in language, length, and use of environmental indicators. For example, a total of 139 environmental metrics were identified among 24 sustainability reports. Roca and Searcy (2012) found similar results in terms of the lack of reporting standardization during an analysis of 94 Canadian companies. Their analysis revealed a total of 585 different metrics[9] were utilized by companies in their sustainability reporting (Roca and Searcy, 2012). The wide range of indicators in this thesis and Roca and Searcy's analysis mirror the results of the literature which conclude that standardization of metrics and indicators represents one of the greatest challenges to reporting (see Brown et al., 2009). Standardization is necessary to benchmark against goals, compare results across companies or geographical boundaries, and permit auditors to verify report contents. Already accepted as the *de-facto* standard for sustainability reporting (Hahn and Kuhnen, 2013; Herzig and Schaltegger, 2011), the GRI provides some level of standardization and should be expanded throughout the business community.

Based on this analysis, approximately 33% of the sustainability reports were verified by an external certification body such as the GRI or the private

[9] Note that Roca and Searcy's analysis included social and economic indicators in addition to environmental metrics. This thesis included analysis of environmental metrics only.

accounting firm Trucost. According to the literature, external verification in the U.S. is remarkably low with estimates ranging from 3% (Brown et al., 2009) to 14% (Herzig and Schaltegger, 2011). Based on this data, the number of verified reports prepared by New England manufacturers is significantly above the national average. Although this finding is encouraging, it is still critical to expand the number of verified reports since the process of assurance provides legitimacy to sustainability reporting programs (Epstein, 2008; Herzig and Schaltegger, 2011; Schaltegger et al., 2006).

To increase report verification, organizations such as the GRI could require that all companies provide external assurance of their report and content after a predetermined number of years of following their guidelines. For example, a grace period of one to two years could be provided to encourage companies to report and allow them time to solidify their environmental management systems. Following the grace period, all companies would be required to verify their report and contents.

The most common environmental indicator among reports was total GHG emissions, monitored by approximately 71% of the reporting companies (see Table 8). Total water use was the second most common indicator, with approximately 54% of the reporting companies providing this information. Scope one and two emissions and solid waste recycling were measured by approximately 46% of the reporting companies. Interestingly, Cowan et al. (2010) conducted an analysis of sustainability reports from the five largest U.S.

companies[10] from each industrial sector and found fairly similar results. Their results indicated GHG emissions were reported by 69% of the companies and water use was measured by 61% of the firms. A striking difference in the results however is that the top metric identified by Cowan et al.'s research was energy consumption, reported by 72% of the companies. Only 42% of firms studied in this thesis reported energy consumption. As noted by Cowan et al. (2010), it is not surprising that most of the companies in their analysis reported energy consumption. By measuring energy, firms can benchmark and begin to reduce their consumption which can have substantial financial benefits, as well as reduce uncertainties surrounding fossil fuel availability. Based on these results, significant opportunities likely exist to expand the number of New England manufacturers measuring energy consumption within their facilities.

An analysis of sustainability reports, including environmental indicators, was also conducted by Leszczynkska (2012)[11]. The study included a review of multinational corporations between 2005 and 2010. The results also indicated that energy, water consumption, and CO_2 emissions were the most common metrics provided in the reports.

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[10] The 130 companies were based on the Forbes Global 2000 list through 2009. The Forbes Global 2000 list includes an annual ranking of the world's largest public companies based on sales, profitability, value, and assets (Cowan et al., 2010). The rankings began in 2004.

[11] This study included a review of 29 sustainability reports prepared by multinational corporations during the years 2005 and 2010. The primary purpose of the study was to evaluate trends in report quality, complexity, and stakeholder value between 2005 and 2010. The reports were specifically collected from international companies.

As discussed above, the most common metric reported by New England manufacturers in this study was GHG emissions. A potential explanation for this result could be due to the GHG reporting required in some jurisdictions. For example, large emitters in Massachusetts are required to report GHG emissions to the Massachusetts Department of Environmental Protection on an annual basis (MassDEP, 2014). Companies not currently mandated to report under state regulations might also consider implementing GHG reporting programs to preempt future potential regulations. In addition, companies may understand the potential impacts of climate change on their business operations and recognize their responsibility to reduce GHG emissions.

The majority of sustainability reports (approximately 92%) in this study could be found on the independent Corporate Register website. Approximately 75% of the reports were available on the GRI website, however only 44% of these were verified GRI reports. The remaining reports were non-GRI, self-declared, or GRI-referenced documents. A total of 54% of the reporting companies utilized the CDP to post environmental sustainability-related data. Of the 47 companies analyzed, approximately 32% were ISO 14001-certified.[12]. Cowan et al. (2010) found the same results during their analysis of sustainability programs. Their research also showed that 32% of the 130 U.S. companies analyzed were ISO

[12] In this thesis, companies were considered ISO 14001-certified if any of their facilities had obtained the designation. In some cases, not all facilities within an organization were ISO 14001-certified. It is not uncommon for companies to quantify how many of their facilities are ISO 14001-certified.

14001-certified.[13] Although the number of New England manufacturers with the ISO 14001 designation was comparable to the findings by Cowan et al. (2010), expansion of the ISO 14001 standard would likely be beneficial to these organizations. For example, the ISO 14001 standard requires corporations to develop an environmental management system and focuses on continuous improvement processes. Due to the customization of the standard[14], the ISO 14001 program can help businesses become more efficient and reduce liabilities associated with environmental externalities. According to the literature, the ISO 14001 standard is also increasingly becoming a necessity to conduct business, as large companies are requiring their suppliers to obtain the certification. This will be an important consideration for New England manufacturers going forward to ensure they remain competitive in the global economy.

5.1 Company Interviews

After completion of the content analysis, 23 companies (approximately 49%) were identified for phone interviews. Companies were contacted when no information could be located regarding sustainability programs within their organization. The response rate from the interviews was approximately 65%. Of

[13] Cowan et al.'s (2010) research does not specify whether companies were considered ISO 14001-certified if any of their facilities had obtained the standard, or if all locations were required to have the standard to be considered ISO 14001-certified.

[14] Although the ISO 14001 standard allows for customization of environmental management systems, reporting standardization could be accomplished through mandating specific methodology and reporting requirements. A full discussion of this standard is outside the scope of this research.

these companies, approximately 33% had some form of sustainability initiative in place. Two of the companies indicated that they were in the process of implementing a sustainability program, and two other firms were taking a close look to consider whether such initiatives would align with their business model. One organization reported data to the CDP but did not produce a sustainability report. In summary, firms were at various stages of reporting including collecting data internally, reporting to industry-specific organizations or the CDP, or preparing to report in the future.

Approximately 42% of the companies interviewed indicated that their production and manufacturing occurred overseas. In several cases, domestic staff was limited to sales and investor relations personnel. During the interviews, overseas manufacturing was a frequent response to explain the lack of sustainability reporting within their organization. This suggests that opportunities exist for manufacturers and buyers to work with their suppliers and contractors to establish sustainability reporting guidelines. Suppliers with robust environmental and sustainability programs minimize risk to their organizations (see Gunasekaran and Spalanzani, 2012; Herzig and Schaltegger, 2011; Orsato, 2009; Wales, 2010), as well as to their buyers. For example, sustainability guidelines can ensure suppliers and contractors are using resources in a sustainable manner and can reduce the likelihood of environmental fines, penalties, or supply disruptions.

During the interviews, there was mixed consensus on the importance of sustainability reporting to stakeholders. Some of the companies reported interest

from stakeholders, and others maintained that financial performance was the only driver within their organization. Brown et al. (2009) corroborates the latter view. However, other researchers suggest that sustainability reporting promotes transparency, which is critical to investors (see Epstein, 2008; Herzig and Schaltegger, 2011). Additional research could be conducted to fully understand the value of sustainability reporting to stakeholders, including investors and consumers.

Chapter 6: Conclusion

Corporations are increasingly adopting sustainable development principles, often referred to as “sustainability”, and reporting these initiatives to the public to add economic and reputational value to their organization. Due to the importance of sustainability to the corporation, community, and the environment, this research was undertaken to extend the literature on sustainability reporting and to understand the programs employed by top New England manufacturers.

Content analysis and interviews were utilized to review 47 publicly-traded manufacturers in the New England region. The findings indicated that approximately half of the companies prepared sustainability reports. The majority of reporting organizations had annual sales revenue over $1 billion and employed more than 1,000 workers. A total of 139 different environmental metrics were utilized, and approximately one third of the reports were verified by an external source. Numerous reporting mechanisms and voluntary standards, such as the GRI, ISO 14001, and the CDP were employed by organizations.

The wide variety of formats and complexity found during this research underscores the need for report standardization and increased verification. Opportunities also exist to develop and expand sustainability reporting programs among New England manufacturers. The prevalence of large organizations indicates that specific consideration should be given to smaller companies, who are mostly absent from the sustainability reporting process.

Understanding the extent of sustainability reporting in New England provides valuable information as to what companies are disclosing. This data could influence policies to address issues such as climate change, water scarcity, finite materials and resources, environmental pollution, and surpassed landfill capacities. By summarizing the extent of sustainability initiatives underway among top manufacturers, this analysis provides information to organizations beginning to report their data or looking to expand their environmental programs. Companies can learn from other businesses and compare their initiatives to fully understand and develop opportunities within their organization and community.

Appendix A Copy of Company Interview Questionnaire

Date _____ Time _____

Company Name _____

Representative _____

Title _____

Direct Phone No. _____

Interview Questions

Does your organization have any environmental sustainability programs? Yes No

If yes, complete the following:

Are they in-house programs, or do you report data externally?

_____

What type of in-house programs do you have?

_____

_____

What metrics and indicators are utilized to measure your environmental impact?

_____

_____

Do you have plans to report the data externally in the future?

_____

_____

Do you have any publicly-available sustainability reports for 2012?

_____

What type of reports are they (stand-alone, GRI, annual 10-K, etc.)?

_____

What is the title of the report?

_____

Where is the report published?

_____

Do you have a publicly-available sustainability report that you could email to me?

_____

Do you participate in the Carbon Disclosure Project or any other environmental programs?

_____

Are you ISO 14001 certified or do you have any other related environmental certifications?

_____

If no, complete the following:

What are some of the reasons for not implementing sustainability or reporting programs?

_____

_____

Does it not align with your business model? Are stakeholders not asking? Is it not considered important to your business brand or identity? Do you not have time, resources or expertise?

_____

_____

Do you have plans to implement sustainability programs in the future?

_____

Do you have plans to report the data externally in the future?

_____

If you do not have plans to implement programs or reporting, would you consider them in the future?

_____

Appendix B Environmental Metrics Identified in Sample Manufacturers' Sustainability Reports

Environmental Metric	GRI Index	No. of Reports
Emissions		
Total GHG by weight	EN16	17
Scope 1		11
Scope 2		11
Initiatives to reduce GHG, reductions achieved	EN18	9
GHG intensity		9
Scope 3		7
Other relevant indirect GHG by weight	EN17	6
NOx, SOx, and other significant emissions	EN20	3
Ozone-depleting substances	EN19	3
GHG from suppliers		3
GHG from air travel		3
Direct GHG		2
Indirect GHG		2
Emissions from data centers		2
VOC emissions		2
Reportable toxic releases and transfers		2
Annual emissions growth		1
Percent GHG offset		1
GHG per value chain		1
CO_2 avoided through waste reduction		1
CO_2 reductions through RECs		1
Percent reduction emissions		1
Non-VOC emissions		1
Percent reduction in reportable releases		1
Relative carbon impact of value chain		1
Hazardous air pollutants (HAPs)		1
Non-GHG emissions		1
Sources of GHG emissions		1
GHG emissions by source (Scope 1 and 2)		1
GHG emissions by business unit (Scope 1 and 2)		1
Total emissions avoided		1
Water		
Total water use		13
Water intensity		7
Water withdrawal by source	EN8	7

Percentage, volume of recycled water	EN10	6
Water sources significantly affected by withdrawal of water	EN9	3
Water bodies significantly affected by organization discharge, runoff	EN25	3
Total water discharge	EN21	2
Wastewater discharge		1
Wastewater discharge intensity		1
Volume water to sanitary sewer		1
Wastewater destination		1
No. of facilities in water stressed regions		1
Waste		
Solid waste recycled		11
Total waste by type and disposal method	EN22	9
Solid waste		9
Hazardous waste		9
Waste diverted from landfill		6
Hazardous waste intensity		5
Solid waste to landfill		4
Weight of transported hazardous waste, percentage transported internationally	EN24	3
Waste intensity		3
Zero waste to landfill sites		3
Non-hazardous waste intensity		2
Solid waste to landfill intensity		2
Solid waste incinerated		2
Solid waste to energy		2
Solid waste composted		2
Non-hazardous waste management method		2
Process waste		2
Hazardous waste management method		2
Hazardous, biohazardous, biological waste		1
Non-hazardous waste		1
Annual waste recycled, MTCE avoided		1
Eco-responsible E waste		1
Electrical equip. refurbished, reused, recycled		1
Non-trash recycling (e waste, metals, batteries, lamps)		1
Waste oil		1
E waste diverted from landfill		1
Cafeteria waste composted		1
Destination of returned products		1
E waste recycled		1
E waste disposition		1
Waste remanufactured, reused, recycled		1

Management of reported toxic chemicals		1
Non-recycled industrial process waste		1
Percent waste reduction relative to targets		1
Energy		
Total energy		10
Energy intensity		10
Direct energy by source	EN3	10
Indirect energy by source	EN4	10
Energy saved due to conservation	EN5	10
Energy conservation initiatives, reductions achieved	EN6	8
Total electricity		6
Initiatives to reduce indirect energy, reductions achieved	EN7	5
Direct energy		4
Indirect energy		4
Total natural gas		3
Renewable energy credits (RECs) (kWh, MWh)		3
Electricity intensity		2
Percent renewable energy		2
Energy efficiency savings (kWh)		2
Energy reduction - data centers		2
Total fuel		1
Total scope 1 consumption		1
Total scope 2 consumption		1
Total scope 1 and 2 consumption		1
Dollars saved due to conservation		1
Renewable energy - percent total energy intensity		1
Percent electricity - RECs		1
Percent of energy offset		1
Green power (bought or generated)		1
Energy for stationary combustion		1
Energy for mobile combustion		1
Percent energy efficiency performance relative to targets		1
Percent reduction in energy consumption		1
Other		
Initiatives to mitigate environmental impact, extent of mitigation	EN26	11
Percent products sold, packaging materials reclaimed by category	EN27	7
Value of environmental fines (USD)	EN28	7
Total number of spills and volume	EN23	7
Significant environmental impacts from transporting goods, products	EN29	4
Total environmental protection expenditures	EN30	4
Spent on remediation (dollars)		2
No. of green buildings		2

Percentage of eco-friendly procurement		2
Percent recycling content in packaging		2
Fleet fuel efficiency		1
Percentage of eco-office supplies		1
Percentage reduction of small dollar orders		1
Percent recycled paper use		1
Cutting oils purchased		1
Risk-weighted environmental index		1
Hours travel time, gasoline, GHG emissions avoided		1
Savings from sustainable productivity (dollars)		1
Global climate protection goals	EN10	1
Total area mined, disturbed, restored		1
Percentage of office personnel commuting via mass transit		1
Packaging size and weight reductions		1
Biodiversity		
Location, size, land in, or adjacent to protected area	EN11	5
Significant impacts on biodiversity	EN12	4
Habitats protected or restored	EN13	4
Strategies for managing impacts on biodiversity	EN14	3
No. of IUCN red list, national conservation species	EN15	1
Materials		
Materials by weight/volume	EN1	4
Percent materials used that are recycled inputs	EN2	3
Material processed and recycled from returned products		1
Material processed and reused		1
Suppliers		
Percent of suppliers audited by third party		3
Percent of high risk suppliers audited		1
Percent suppliers meeting EH&S		1

Appendix C Summary of Recommendations

Recommendations

1. Conduct research to understand sustainability reporting among businesses on a municipal level.
2. Conduct additional research to develop and expand sustainability reporting programs among New England manufacturers.
3. Conduct research to understand how education and training might be utilized to expand the number of reporting organizations.
4. Explore opportunities for information sharing between companies.
5. Conduct research to understand challenges facing small businesses and the implementation of sustainability reporting programs.
6. Explore opportunities for Maine and New Hampshire business associations and policy makers to assist with providing sustainability reporting information to manufacturers.
7. Expand use of the GRI as method for increasing standardization.
8. Increase use of third party verification to increase legitimacy of reporting programs.
9. Implement policy within GRI to require verification after set number of years of reporting.
10. Increase number of New England manufacturers measuring and reporting energy consumption.
11. Conduct research to expand number of ISO 14001-certified New England manufacturers.
12. Establish programs for buyers and suppliers to establish sustainability reporting guidelines.
13. Provide education for compliance professionals on the opportunities surrounding sustainability and associated reporting.
14. Conduct additional research to understand the value of reporting to investors, consumers, and other stakeholders.

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