Corporate Strategy and Sustainability Reporting:

A Study of Sustainable Competitive Advantage by applying Sustainability Performance Indicators to Reported Forest Industry Costs

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Executive Summary

Firms operating in a free and open market, regardless of the industry sector, are subject to competitive pressures and require competitive advantage to succeed. If a company could more easily report on sustainability initiatives undertaken by the company, both tangible and intangible, the company could use these performance indicators as a tool in future strategic planning.

For the most part, the key requirement that enables a company to reach and maintain financial success is in creating value: the value that is recognized in consumer market share through the achievement of a sustainable competitive advantage (SCA).

From Friedman's position, a firm must manage the social, environmental and financial factors of operations in order to develop and maintain a SCA. Barney's SCA is dependent on ensuring differentiation through quality, accountability and responsible operations combined with a cost-effective product or service.

Following this framework of value creation and SCA, it becomes clear that there can be specific performance indicators identified that influence sustainability on multiple dimensions. The financial viability of the company is dependent upon the creation of a competitive advantage, whether by cost or differentiation. For resource development companies, the return-on-equity is administered over a long planning horizon, often 25 years or more. Financial sustainability, then, is dependent upon the maintenance of this competitive advantage, or the achievement of the SCA.

Developing performance measurements that can track the capability gap between competitors and producer will allow companies to better define their position in the market. Companies should be able to correlate their operations to performance measurements that articulate the core competencies in which they operate, or a protocol that better defines their SCA.

Sustainability Reporting (SR) aims to enhance the rigour, quality and utility of a reporting format that can be used in correlation with annual reporting. SR is becoming an accepted approach in implementing strategic plans that consider cost information while also focussing on other important strategic metrics, thereby allowing managers to draw more comprehensive understandings of how to best maintain and position the competitive advantage. Global Reporting Initiative (GRI) provides the detailed guideline which outlines techniques used to enhance an organization's ability to more consistently and comprehensively report on the economic, environmental and social dimensions of its activities, products and services.

This project details a pathway of research that has focused on developing a correlation between the GRI Sustainability Reporting Guidelines and reported costs from forest company operations, specifically the woodlands operation of Canadian pulp and paper companies. This cost data was captured in the 2003 PricewaterhouseCoopers (PwC) Global Forestry Survey.

The research method followed a logical approach where the definitions of each GRI indicator were applied against the definitions of cost items in the benchmarking survey data. The analysis of the GRI indicators only included those indicators that reflected a positive or beneficial externality for the reporting company. The results of the correlations of cost to sustainability show that there are clear differences in expenditures for firms following differing strategies. Data suggests that a determinable pattern could be extracted that would support enhanced sustainability performance by an environmentally-focused company.

As a tool for managing the competitive advantage, SR can provide a great deal of traceable information that can be used for external reporting and internal management. Correlating operational costs to sustainability performance can be a valuable tool for resource management companies that endeavour to build strong stakeholder relationships, sound management practices, dependable employee management programs, and stronger public images. This insight will allow managers to extend their strategic viewpoint and manage their competitive position further into the future. And by correlating this framework with the reported results of the benchmarking survey, a reporting company can create an annual tracking report that provides insight into competitive position for both operational costs and the management of SCA.

1.0 Introduction

Firms operating in a free and open market, regardless of the industry sector, are subject to competitive pressures and require competitive advantage to succeed. And increasingly firms are finding a need to engage in activities that will ensure the long-term competitive advantage of the company is maintained, or sustained. If a company could more easily report on sustainability initiatives undertaken by the company, both tangible and intangible, the company could use these performance indicators as a tool in future strategic planning.

Milton Friedman, an advocate of price theory and competitive positioning, states, in regards to the social responsibility of business, that "a manager's responsibility is to conduct the business in accordance with [owners] desires, which generally will be to make as much money as possible, while conforming to the basic rules of the society, both those embodied in law and those embodied in ethical custom. …the manager is the agent of the individuals who own the corporation or establish the institution, and his primary responsibility is to them. …there is one and only one social responsibility of business–to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud."[1] Changes to business in the past forty years have seen more stringent financial reporting and environmental compliance regulation. The expectations that companies are operating in a socially responsible manner, where corporate practice reflects ethical custom and embodied law, have a large impact on market share, investor confidence, and risk management. The profit motive results in a focus on cost accounting, margins, and return on equity, and utilizing accounting protocols that directs many of the operational decisions companies make today. The externalities of social custom and embodied law are managed as risk and calculated into operational performance. Clearly, better tools are required by managers to integrate externalities into performance planning.

For the most part, the key requirement that enables a company to reach and maintain financial success is in creating value: the value that is recognized in consumer market share through the achievement of a sustainable competitive advantage (SCA). This advantage over competitive forces is driven by a corporate desire to provide or enhance value to that consumer by focusing on the creation of a niche advantage that can be capitalized upon.

Michael Porter describes competitive advantage as a condition where the firm's resources and capabilities together form its distinctive competencies which can be leveraged to create a cost

advantage or a differentiation advantage.[2] Cost advantages are driven by a focus on margins and expenses and an interest in minimizing expense to provide the most affordable product whereas a differentiation advantage can be achieved through quality, location, timing, customer service, product recognition, and other impacts on market decisions. Maintaining a competitive advantage over competitors, whether by cost or differentiation, can therefore be considered the sole responsibility of a company, enabling it to capture market share, generate revenues, secure investors and achieve profit.

Barney first described strategic goal of the resource-based view (RBV) as securing the factors needed to create core competencies that form the basis for establishing and sustaining competitive advantage.[3] Companies obtain sustained competitive advantages by implementing strategies that exploit their internal strengths, through responding to environmental opportunities, while neutralizing external threats and avoiding internal weaknesses.[4] Barney defines sustainability as dependent on the "possibility of competitive duplication", that is…"a competitive advantage is sustained only if it continues to exist after efforts to duplicate that advantage have ceased[5]. Barney states “to create a[n] [SCA], a resource must have four attributes

1. It must be valuable, in the sense that it exploits opportunities and/or neutralizes threats in a firm's environment,
2. It must be rare among a firm's current and potential competition,
3. It must be imperfectly imitable. Attributes, though valuable and rare, can claim sustainability only if competing firms cannot possess them. This inimitable quality of the attribute can derive from three sources:
    a. Unique histories or a firm's unique historical position in space and time.
    b. Causal ambiguity; this occurs when competing firms, including the firm with the sustained competitive advantage, do not understand the link between the resource(s) and sustained competitive advantage. This fuzzy perception makes imitation of the resource or resources difficult, if not impossible.
    c. Social complexity: Social relations, culture, traditions, positive reputation, etc. can be intertwined into an extremely complex social web difficult to imitate.
4. Finally, there cannot be strategically equivalent substitu*tes* for this resource that are valuable but neither rare nor imperfectly imitable.[6]

Coyne describes SCA as being a meaningful strategy only when three conditions are met:

1. Customers perceive a consistent difference in important attributes between the producer and the competitor;
2. The difference is a direct consequence of a capability gap between the producer and the competitors;
3. Both the difference in important attributes and the capability gap is expected to endure over time.[7]

Barney's RBV is an important framework for this study in that the nature of SR provides companies with the ability to quantify performance along the measures of a SCA, and further allows them to cater that reporting to niche advantages that create competitive edge. Managers can better understand how their resources can be optimized by exploring the externalities and impacts of a company's operations expressed through sustainability performance.

Friedman specifies that a firm must operate within embodied law and ethical custom, which satisfies the requirement of a firm to ensure that environmental and social risks are managed. Therefore, from Friedman's position, a firm must manage the social, environmental and financial factors of operations in order to develop and maintain a SCA.

Porter describes how this advantage is achieved through focusing on either cost or differentiation. Barney's resource-based view of strategic management enhances this view by stating that SCA is achieved by managing the firm's resources in such a way that creates the characteristics of competitive advantage. And that truly sustainable competitive advantage is dependent on ensuring differentiation through quality, accountability and responsible operations combined with a cost-effective product or service. Following this framework of value creation and SCA, it becomes clear that there can be specific performance indicators identified that influence sustainability on multiple dimensions. If these indicators are utilized to track operational performance of a firm's activities, a defensible model can be used to guide decision making.

Coyne perfectly describes how a resource development company will need to maintain corporate sustainability. Access to resources and how those resources are managed provides each company with the opportunity to create a capability gap. Developing performance measurements that can track the capability gap between competitors and producer will allow companies to better define their position in the market. Companies should be able to correlate

their operations to performance measurements that articulate the core competencies in which they operate, or a protocol that better defines their SCA.

In fact, a great deal of research and effort has now produced sustainability reporting guidelines from the Global Reporting Initiative (GRI), a program in the Netherlands sponsored by the United Nations Environment Program in 1999. The GRI published the first set of guidelines in 2001, entitled the *GRI Sustainability Reporting Guidelines*. [8] The program's objective continues to focus on enhancing the quality, rigour and utility of sustainability reporting while building common and shared understandings of its implementation. The GRI provides the detailed guideline free on-line in which it outlines techniques used to enhance an organization's ability to more consistently and comprehensively report on the economic, environmental and social dimensions of its activities, products and services. In this way, the GRI fosters shared understandings of the characteristics that contribute to each reporting dimension as well as providing detailed definitions of the specific indicators that contribute to each component. A review paper by W. G. Stephens that summarizes the 200-page *GRI Sustainability Reporting Guidelines* has been provided in Appendix I.

This project details a pathway of research that has focused on developing a correlation between the *GRI Sustainability Reporting Guidelines* and reported costs from forest company operations, specifically the woodlands operation of Canadian pulp and paper companies. These reported costs represent two distinctive choices for companies in the natural resource development industry of being cost focused or environmentally focused. Sustainability reporting will follow the accepted protocols detailed in the 2002 GRI guidelines and correlate the defined indicators to specific reported cost data in secondary data supplied to the project.[1] A discussion paper by W. G. Stephens that explores sustainability reporting in the Canadian forest industry and the dynamics of performance in each dimension is provided in Appendix II.

The secondary data consists of specific cost data segmented by task and expenditure to each sector of the woodlands operational chain. This data was captured in the 2003 PricewaterhouseCoopers (PwC) Global Forestry Survey. Appendix III and IV detail the

[1] It is important to distinguish between correlation and causation when referring to performance indicators. In this project, a correlation exists when the definition of one element relates in similarity or application to the definition of its counterpart. Causation will refer to the presence of an element that leads to the materialization of its counterpart.

definitions of line items and a sample survey that was utilized to capture the data used in this project. The results of these correlations produce a working model of sustainability reporting that can be graphically represented when applied to the segmented data. The results of this study will also further enable forest product manufacturers to more accurately report on corporate sustainability performance measures that correlate strongly with their identified corporate strategy, cost or differentiation. Utilizing this applied framework, forest companies can define their SCA through operational performance, and subsequently learn to optimize it.

As such, the data utilized in this project provides the ability to conduct a thorough analysis on differences for both a cost-focused and environmentally-focused company. These differences will report on sustainability performance as measured through the defined indicators provided by the GRI.

A critical component of this project was the researcher's role of formulating a comprehensive knowledge of sustainability reporting protocols. As such, a thorough review of two main reports was undertaken. First, the *GRI Sustainability Reporting Guidelines* which have been summarized in Appendix III and Tables 1 through 6 of this report. The GRI guidelines provide a detailed set of definitions for each dimension of corporate sustainability performance. And second, a report by Stratos entitled *Building Confidence: Corporate Sustainability Reporting in Canada* published in November of 2003.[9] The Stratos report explores the current state of reporting sustainability in Canada and verifies how the GRI guidelines have been used as preferred templates in nearly all cases.

This study does not explore why a given company would follow a cost-focused strategy as opposed to an environmentally-focused strategy. There are many mitigating factors that would require a company to position itself within each of the two strategies, and indeed some companies may even shift this focus back and forth between these strategies over time. The very nature of lumber, pulp and paper being priced as a commodity and subject to volatile pricing and trade disputes may also affect which strategy is chosen. These issues are not explored here.

This project was performed as a part of studies undertaken in the Master of Business Administration program with the University of Saskatchewan for the 2003/2004 academic year. Project advisors included Dr. Grant Isaac of the University of Saskatchewan and Mr. Ray Luchkow of PwC Edmonton.

2.0 Defining Corporate Sustainability

An exploration into defining sustainability shows that the meaning carries with it a strong commitment to future resource capability while maintaining a devotion to current needs. These current needs vary from company to company but often include performance measures such as profitability, staff turnover, and market capitalization. The current needs must be satisfied at no peril of the future.

Webster's unabridged dictionary defines sustainable as "capable of being kept in existence or maintained" and sustainability as "the property of being sustainable".[10] Sustainability, then, truly is an important part of planning for a company that hopes to achieve a return-on-equity over the long term, which inherently requires that the company be kept in existence through the maintenance of profitable operations.

Sustainable development was first officially defined by the United Nations Brundtland Commission in 1987, stating 'Sustainable development means to meet the needs of the present without compromising the ability of future generations to meet their own needs.' [11] This definition, while simple, is profound in meaning. The needs of today are measurable and definable: profitability, productive and involved staff, skilful management, high quality service, good product image, maintenance and expansion of market share. These needs, and others, drive the corporate strategy and bind companies to a set of operations. To do so at the peril of future operations would be folly. The future generation represents not only the youth and future peoples of the world but also the next project and the next inherent need. The next generation of operations must have the ability to satisfy its own needs at no cost from current operations. And so a company must consider the externalities of operations both now and into the future in order to ensure the competitive advantage is maintained. Again, these externalities can be different for each company and can include many impacts relating to sustainability performance, such as environmental degradation, regional employment, and national economic stability, of which each can be expressed through a specific performance indicator. Sustainable development planning must fully capture the externalities of all environmental, social and economic impacts of the company in order to truly optimize the capability gap and strengthen the SCA.

In 1992, the World Bank defined sustainability as '…basing developmental and environmental policies on a comparison of costs and benefits and on careful economic analysis that will strengthen environmental protection and lead to rising and sustainable levels of welfare' [12] and a further definition stating sustainability as '…an approach that will permit continuing improvements in the quality of life with a lower intensity of resource use, thereby leaving behind for future generations an undiminished or even enhanced stock of natural resources and other assets.' [13] These definitions show a clear recognition that social and economic impacts are as critical as environmental impacts on ensuring that the externalities of company operations do not deplete the opportunities of the future, and that if managed properly and with due diligence these opportunities may even be enhanced.

From these definitions, then, a supposition about sustainability with respect to the purposes of this research is formed. The financial viability of the company is dependent upon the creation of a competitive advantage, whether by cost or differentiation. This competitive advantage must be maintained through time in order to realize expectations. For resource development companies, the return-on-equity is administered over a long planning horizon, often 25 years or more. The maintenance of the long-term viability of the company is crucial in order to realize the investment. Financial sustainability, then, is dependent upon the maintenance of this competitive advantage, or the achievement of the SCA. This SCA is not easily quantifiable and usually a function of many exogenous and endogenous variables. However, it is possible to identify the controllable endogenous variables and then track them against defined sustainability indicators. Some uncontrollable exogenous variables can also be identified through these same indicators, though these tend to be more industry sector-specific and require detailed analyses. These variables are represented in the framework established by the GRI where definitions represent social, environmental and economic performance indicators of the operations of a company.

This project defines corporate sustainability as: *the pursuit of SCA through a commitment to improve the environmental, social and economic conditions resulting from the enterprise.*

3.0 Corporate Strategy

The segmentation of data utilised in this project has allowed for the analysis to focus on two distinct corporate strategies. In resource development industries, companies can often choose to follow an environmental focus of operations or a cost focus on operations. The environmentally-focused company may make additional investments into environmentally-sustainable initiatives beyond regulatory requirements whereas the cost-focused company may choose to minimize expenditures beyond environmental compliance.

Again, this study does not explore why a given company would follow a cost-focused strategy as opposed to an environmentally-focused strategy. Each of the chosen strategies bears its own risk-reward scenario in that the company choosing not to invest in environmental initiatives beyond compliance may bear heavier costs when stricter regulatory protocols come into place but also has a much lower cost load. An in-depth financial analysis would of course provide a solution, but that does not form part of this work.

For example, Company A spends $2,000,000 on a regeneration plan that utilizes premium seedling stock to enhance the yields by 30% at harvest rotation, while exceeding the minimal seedling density and other regulatory protocols in operations. Company B chooses to spend $800,000 on a regeneration plan for a similar sized management area but plans to utilize the most cost-effective seedlings available and plant to the minimum regulatory compliance. Company B has also planned for an additional $75,000 in re-planting from anticipated mortality in order to maintain minimal seedling density. Company B has saved a great deal of money over Company A in current cost. However, it is important to note the inherent risk taken on by Company B should regulatory compliance require an increased number of seedlings or other stricter protocols. Company A is in a better position to manage compliance fines or re-work, and may gain accounting credits if governments begin to acknowledge carbon and oxygen benefits. Company A also expects to yield 30% more for their tree stock than Company A by having spent $1,125,000 more on the regeneration program. That value will be solely determined by market price, which in turn is determined by quality, species, wood density, wood clarity, and many other factors not explored in this project. The additional carbon sequestration and oxygen production provided by these trees are an ideal example of a beneficial externality.

For the purposes of this project, the two distinct corporate strategies identified are that of an *environmentally-focused company* and a *cost-focused company*.

4.0 Defining Sustainability Reporting

The rise of the modern economy, spurned by the industrial and technological revolution of the 19th and 20th centuries, created a vast multitude of specialist companies each struggling to create value and achieve profit in a chosen market niche. In the free market, each company is free to follow a cost or differentiation strategic pathway of their choosing, or both.

For resource development companies, the focus on cost control was a primary driver historically and led to severe environmental impacts, such as road failures and erosion due to massive deforestation. These impacts were regarded as market failures or the recognition that environmental sustainability had no immediate financial benefits, leaving most companies to choose whether to invest in these practices. Through the development of forest management as a science, protocols for operations were mandated into regulation and impacts were monitored and mitigated. Resource development companies integrated these protocols into operations only when all producers in the market are forced to do so. Environmental compliance is not a choice and regulatory needs are built into the planning scheme. Until the early 1960's when forestry logging practices came to the forefront of social concern, forest development companies were quite free to manage their resources how they saw best fit and operations were not intricately regulated. That has drastically changed over the past 40 years and development companies must now achieve both strict environmental compliance and cost-controlled profitability. Some companies choose to invest more in these environmental practices, while others do not. This allows for a segmentation of companies into these two strategic directions.

Even as social scrutiny of corporate financial reporting practices became more codified through the 1980's, leading to current General Accepted Accounting Principles (GAAP), companies have been able to subvert the system and adversely affect the sustainability of their company's future. Recent corporate governance scandals such as ENRON and WorldCom, combined with other recent devastating environmental impacts such as the Juan Valdez oil spill and the deforestation of Brazil, have driven consumers to demand a more comprehensive and globally representative reporting format that allows a focus on not only the internal operations of the company as reported on annual financial statements, but also the externalities it creates on society, the economy and the environment.

This has lead to the recent modelling of Sustainability Reporting (SR) that aims to enhance the rigour, quality and utility of a reporting format that can be used in correlation with annual

reporting. This reporting provides a more comprehensive picture of the social impacts, and benefits, that are created through the operations of the company that can be used by a wide array of stakeholders. This format utilizes quantified indicators contributing to social, environmental, and financial or economic performance and reports on the impacts of these indicators to corporate sustainability. These protocols are currently voluntary allowing for companies to choose how these reports are used. If SR is used for internal management planning then information on economic and environmental externalities have a direct effect on how operations are managed, and how regulator and land stakeholder relationships can be best managed. SR used for external reporting may focus more on beneficial externalities, further explored in Section 4.0.

Triple bottom line (TBL) reporting and SR are terms that are linked, but may not necessarily be interchangeable. TBL reporting focuses on the three dimensions of sustainability, namely social, economic and environmental, but does not fully satisfy reporting needs for corporate governance and market pressures. SR is a more comprehensive approach that builds on TBL reporting to quantify the impacts of companies operations, including market pressures and corporate governance. Another linked term is Corporate Social Responsibility (CSR) which focuses primarily on the social costs and benefits to community, workplace, and quality of life through the operations of a company. And as such, defining the use of sustainability becomes a critical component in the application of tasks to SR.

First, let us visualize the SR structure as a three-legged stool. Figure 1 shows how this can be visualized. The underlying principle of SR is such that each dimension of sustainability is dependent on the other. The inter-connectivity of each sustainability dimension requires that attention is given to each facet of SR in order to achieve corporate stability. The stability of the three-legged stool is an allegory for sustainability. Each reporting dimension must maintain a certain level of performance in order to maintain balance or stability. Corporate governance, with this approach, can be assumed to be the base of operations from which sustainability is built, or the floor under the stool. Skilled, competent staff members will build upon corporate governance practices to raise each sustainability dimension to a level that achieves the SCA. The focus on cost control

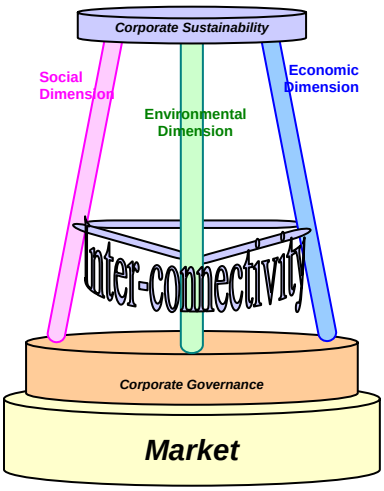


Figure 1 – The "Stool Approach" to Sustainability and the Firm

and profitability is still maintained in order to effectively serve the current needs. As well, this corporate governance acts within the ethical custom and embodied law of the market. The model helps visualize how corporate sustainability, then, becomes dependent upon maintaining proper control over each dimension of sustainability performance. That these sustainability dimensions are dependent upon strong corporate governance practices, and that these all act in unison to create the SCA in the market. The model also helps visualize the tenuous nature of this balance, and how if performance in any one of the sustainability dimensions is not met, then the stool could fall off the platform. A stool off the platform is the allegory for a company losing its sustainable competitive advantage in the market. This model is used to frame the pathway of research for applying the SR indicators detailed by the GRI to the reported cost data.

SR is a tool used to assist in strategic planning and provides managers with performance indicators that are not directly cost-related. The connection between corporate vision and financial performance is not always best defined through cost metrics. The achievement of corporate sustainability requires a strategic focus, not merely cost control. SR is becoming an accepted approach in implementing strategic plans that consider cost information while also focussing on other important strategic metrics, thereby allowing managers to draw more comprehensive understandings of how to best maintain and position the competitive advantage. Reporting on sustainability provides insight and informational trends that can be used in decision-making and corporate reporting so that activities and decisions explicitly assess the impacts on natural and human capital, as well as financial capital.

Therefore, in order to apply SR, it is important to establish a common understanding and applied definition of the three SR components and to determine the specific indicators that can be correlated to each dimension of sustainability. This comprehension then leads to an ability to correlate the identified indicators to reported industry costs.

The definitions of sustainability indicators detailed in the *GRI Sustainability Reporting Guidelines* provide the framework for this work. An important consideration when utilizing the GRI guidelines will be to make the distinction between indicators that trace negative externalities and those that trace beneficial externalities. A beneficial impact was determined by simply referring to the definition of the indicator and stating that the higher the reported cost or value for that indicator then the more beneficial it would be externally. If the opposite held true, it would be

considered a detrimental impact. Some noted indicators will require further information as to the context of measurement in order to determine whether it is a benefit or a cost to society.

4.1 Defining the Economic Dimension of Sustainability Reporting

The economic dimension of sustainability represents an organization's impacts on the economic circumstances of its stakeholders and on economic systems at all levels. This dimension reports on both the traditional economic measures of a firm as well as reporting on other indicators that may affect a firm's long-term sustainability. The traditional measures used in financial accounting and typical financial statement reporting are augmented with other non-tangible asset reporting. Reporting on economic performance is intended to incorporate an acknowledgement of value beyond the value recognized in traditional financial reporting.

Financial indicators follow pre-defined reporting mechanisms that focus primarily on the profitability and operations of an organisation. This information is then used internally to support management decision making as well as externally by market valuators, shareholders and prospective investors. These typical financial reporting indicators most typically follow GAAP and can be found in most annual reports of publicly traded firms.

Economic indicators of sustainability, while including traditional financial indictors, include a focus on the direct and indirect economic interactions of both internal and external stakeholders. As such, economic impacts can be divided into direct and indirect impacts of which a set of economic indicators can be applied. These indicators correlate directly to economic sustainability and as a result, form the applied definition of this dimension of SR. Direct economic impacts are relatively easy to measure and include information about impacts to consumers, suppliers, employees, investors and the government. The indirect economic impacts may be more difficult to measure and include any major externalities associated with the organisation's products or services. These impacts will allow the company to present data that tracks performance on economic contributions to society as well as the externalities of operations. By showing the contributions to society, a company can better understand what part of operations has an impact on issues that are important to stakeholders.

4.1.1 Economic Performance Indicators

GRI identifies and defines six groups of economic indicators. GRI further identifies whether that indicator is a core indicator that substantially contributes to sustainability or whether it is a

secondary indicator, where the effect on sustainability is less tangible yet still deemed critical to success. These indicators are also further assigned to being either direct or indirect economic impacts. Table 1 outlines the thirteen economic indicators detailed in the GRI 2002 guidelines. Of these thirteen indicators, ten are considered beneficial and three will be dependent on the context of measurement.

4.2 Defining the Environmental Dimension of Sustainability Reporting

The environmental dimension of sustainability reporting has received the most study as a result of the social concern over environmental impacts from resource development companies. Developments in this field, spurned by social pressure, saw stricter regulations and compliance established to ensure that environmental sustainability became a crucial part of the strategic plan for all manufacturing and resource based firms. The study of environmental sustainability is in fact an applied science, where considerable degree of knowledge has been generated and implicitly shared. The benefit that SR can provide to this comprehensive science is in consolidation and comprehensiveness. The environmental efforts of a company as a whole are seldom visualized. Environmental compliance and impact mitigation form part of the operational plan for resource development firms but there is no reporting structure that consolidates the effort to show performance and externalities on this critical measure of sustainability. Beyond environmental compliance lies environmental diligence, which can often make environmental risk much easier to manage in the resource development market. The GRI guidelines refer to a separate and more distinct meaning of environmental impacts. And from this extensive knowledge, the GRI has identified the primary environmental indicators that apply to a firm operating with external resources. These indicators attempt to quantify the organization's impacts on living and non-living natural systems, including ecosystems, land, air and water. These natural systems form a critical part of the management of the forest product value chain and the value in reporting on these investments can be used by managers, investors and the public.

The GRI notes that the reporting organization should relate their individual performance to the broader ecological systems in which they operate, which for the forest product value chain is a global concern. This environmental performance must also be normalized in order to allow for comparison and benchmarking across projects and companies.

Companies operating in the forest product value chain undertake many environmental initiatives and investments in order to maintain long-term sustainability of the resource and achieve environmental compliance. Some firms, operating with enhanced diligence, invest beyond compliance and can create external benefits to society as a result of their operations on the resource. This benefit can translate to an enhanced corporate image, more focussed marketing strategies, stronger investor relations, more integrative stakeholder management and efficient regulatory reporting. Other firms operate with a cost focussed mandate and achieve minimal environmental compliance as a means of achieving higher profit. These two strategies represent the two strategies of Michael Porter, that of cost and differentiation competitive advantages. This research explores data representing environmental expenditures from these two types of strategic directions.

As a renewable resource, forest products can be intensively managed through timber supply analyses and growth and yield projections that allow land managers to accurately determine a sustainable development pattern, or the annual allowable cut. The results of these environmental initiatives have vast implications on the future capability to manage the forest resource and, as such, are sustainable by nature. However, these initiatives are implemented as a result of enacted provincial, federal and international legislation that stipulates the reporting protocols and management activities for sustainable development of the forest resource and therefore are a part of operations and not completely recognized in the GRI format. The GRI environmental indicators instead trace activities that are externally detrimental to the environment as a result of operations as well as report on the beneficial environmental externalities that companies invest in.

4.2.1 Environmental Performance Indicators

GRI identifies ten groups of environmental indicators and details the characteristics of their value. Due to the regulated commitment to environmental sustainability as an integral part of operations for forest product manufacturers, the indicators for this dimension will not be comparable to other industries. Table 2 outlines the thirty-three environmental indicators detailed in the 2002 GRI guidelines. Of these thirty-three indicators, twenty-six are considered detrimental impacts, four are considered beneficial impacts, and three will be dependent on the context of measurement.

4.3 Defining the Social Dimension of Sustainability Reporting

The social dimension of sustainability concerns an organization's impacts on the social systems within which it operates, and maintaining a commitment to assisting in the sustainability of social values through a corporate focus on established policies and protocols. The codification of policies and procedures that address key social issues is critical in determining the "moral position" of the company, important to investors and stakeholders. Indicators relating to child labour laws, freedom of association and forced or compulsory labour may seem somewhat irrelevant for companies in developed nations but the global marketplace and chain of suppliers is becoming increasingly interconnected, and the social focus on these issues is profound. The ability to utilize the GRI format to address each key element can help a company better understand the impacts throughout the value chain with which it is involved as well as provide information and support to employees, stakeholders, investors, regulators and the public.

The stakeholders of any value chain are often impacted by independent decision making from businesses attempting to achieve their own current needs. Social sustainability attempts to satisfy the long-term needs of these stakeholders by creating formal and structured policies that address key issues. The GRI format allows for a common set of principles to address community-based resource management issues. Resource development companies that invest in the needs and opportunities for indigenous people can report these activities to enhance the stakeholder relationship.

Socially sustainable contributions by the company can impact the long-term viability of that company and leads to discussion about CSR. CSR can be broadly described as the ethical behaviour of a corporation towards society, or the impacts of the decision making on the social sustainability of society. Reporting on CSR is about the interaction of the corporation with the legal and social obligations of the societies in which it operates, and how it accounts for those obligations. These are the same principles that drive the social dimension of the GRI guidelines.

The GRI format also allows the reporting company some flexibility with the level of depth any particular dimension, or indicator, is studied to. For resource development companies, the social dimension of corporate sustainability is a critical part of diligent resource management and includes not only stakeholder management but employee and investor relations. A company can choose to take any element of SR to a level of depth appropriate for their strategy.

This model must account for the different societal views in which the company operates and, perhaps more importantly, assess the value and impact of the firm's decisions on the regional, national and global society. In the forest product value chain, decisions create extensive impacts to stakeholders and adequately determining quantifiable indicators for the inclusion of their value propositions is critical to fully capturing that value, and reporting on it. Each stakeholder in the forest product value chain may not value sustainability in the same way, inherently creating differing applications regarding inclusion into social reporting. Where one firm focuses on cost control and minimizes stakeholder engagement and regulatory interaction, another company may find it more sustainable to invest in policies and procedures that develop these relationships.

The value in creating a common understanding of a format that can be benchmarked across the industry, and possibly into others, is an active process for the reporting company. The format itself engages stakeholders, investors, regulators, and employees in a method that develops shared understandings through defining policy and procedure. Again, this is where GRI provides a shared understanding of the application of social reporting and which common indicators can be assessed. Each market niche will have different relevant issues and inherently different relevant indicators. The GRI suggests that a stakeholder consultation process be implemented in order to ensure that all social impacts and assessment of value to stakeholder groups is properly reported.

The indicators provided by GRI identify generalized performance parameters that report on labour practices, human rights, and broad issues affecting consumers, community, and other stakeholders in society. Some of these indicators do not rely on quantifiable metrics but rather a qualitative process that assess the firm's systems and operations, including policies, procedures, and management practices. The GRI has built these common indicators from internationally recognized human rights and labour standards established by the United Nations and the Organisation for Economic Co-operation and Development (OECD).

An underlying proposition regarding the identification of these indicators is that a company should seek to enhance the quality of the working environment for its human capital and that the company should endeavour to enhance the value of the relationship with the worker and the value of that worker in society. Through these initiatives, a company can also report on CSR.

4.3.1 Social Performance Indicators

GRI identifies four main focus groups of social indicators and details the characteristics of indicators within these defined segments. These four main segments of social sustainability reporting are human rights, society, product responsibility, and labour practices and decent work. However, GRI strongly recommends that stakeholder involvement is critical to determining all relevant impacts are accounted for, on a regional, national and international level. Tables 3 through 6 outline the forty-nine social indicators detailed in the 2002 GRI guidelines. Of these forty-nine indicators, seven are considered detrimental impacts, forty are considered beneficial impacts, and two will be dependent on the context of measurement.

5.0 Research Methodology

Resource development companies integrate sustainability initiatives as a part of embodied law of ethical custom. While some operate with a focus on cost control and maximizing profit, other companies operate with a moderate return-on-equity yet invest a great deal in sustainability initiatives. These two different strategies are not reflected in traditional annual reporting.

The intangible assets created through sustainability initiatives determine the long-term viability of the resource development company. The decisions made by resource development managers are often not recognizing how sustainability initiatives can have an extensive impact on the operations of forest product processing, simply because there is no consolidated format. With identified sustainability indicators, companies can now correlate their operations with certain aspects of corporate performance that are critical to strategy. The indicators provided by GRI provide a working template from which to apply sustainability reporting to all companies, most especially resource development companies.

Table 7 – External Impact of Indicator Performance

Economic		Environmental				Social							
EC1	+	EN1	-	EN18	-	SO1	+	HR1	+	PR1	+	LA1	+
EC2	+	EN2	-	EN19	+/-	SO2	+	HR2	+	PR2	+	LA2	+
EC3	+	EN3	-	EN20	-	SO3	+	HR3	+	PR3	+	LA3	+
EC4	+	EN4	-	EN21	-	SO4	+	HR4	+	PR4	-	LA4	+
EC5	+	EN5	-	EN22	+	SO5	+/-	HR5	+	PR5	-	LA5	+
EC6	+	EN6	-	EN23	-	SO6	-	HR6*	+	PR6	+	LA6	+
EC7	+/-	EN7	-	EN24	-	SO7	+	HR7*	+	PR7	-	LA7	-
EC8	+	EN8	-	EN25	-			HR8	+	PR8	+	LA8	+
EC9	+	EN9	-	EN26	+			HR9	+	PR9	+	LA9	+
EC10	+	EN10	-	EN27	+			HR10	+	PR10	-	LA10	+
EC11	+	EN11	-	EN28	-			HR11	+	PR11	-	LA11	+
EC12	+	EN12	-	EN29	-			HR12	+			LA12	+
EC13	+/-	EN13	-	EN30	-			HR13	+			LA13	+
		EN14	-	EN31	+			HR14	+			LA14	+
		EN15	+	EN32	-							LA15	+
		EN16	-	EN33	+/-							LA16	+
		EN17	+									LA17	+

Table 7 provides an overview of each GRI indicator and how it can be perceived in relation to negative or detrimental externalities and those that trace beneficial externalities. For the purposes of this work, only GRI indicators that reflect an external benefit are utilized in the analysis. The determination of how a specific indicator received a beneficial or detrimental externality was based solely on the definition of the indicator. As shown in Table 7, some indicators may carry both a detrimental or beneficial externality, based on the definition. For example, EC4 is defined as the percentage of contracts that were paid in accordance with agreed terms, excluding penalty agreements. Therefore, the higher the percentage paid then the more beneficial the externality. With EN25, the definition states the degree of impacts of activities and operations on protected and sensitive areas. Therefore, the higher the degree of impact then the more detrimental or negative the externality. EC7 is defined as an increase/decrease in retained earnings at the end

of the period. Therefore, dependent upon the result of retained earnings, there would be either a beneficial or detrimental externality.

5.1 Research Problem

The Stratos report, *Building Confidence: Sustainability Reporting in Canada*, details several Canadian forest product companies that are now following the GRI format and integrating sustainability reporting into the performance reporting. Companies such as Abitibi and Weyerhaeuser will have far different corporate strategies. The noticeable element about reviewing the sustainability reports from these firms is the differences in application and focus, reflecting the vastly different issues and needs of their market niche. The advantage of using a standardized sustainability reporting format allows for benchmarking comparisons over different companies in the forest product industry.

Reported cost data that are benchmarked across the forest product industry woodlands operations can be directly correlated to SR. The benchmarking costs in the segmented data set provide a standardized overview of operations so that managers across the industry can benchmark their performance, market position, and manage their competitive advantages.

Not all sustainability indicators will be represented in a company's cost reporting data. The ability to apply these costs to a sustainability indicator will allow for a correlation to a corporate strategic focus, thereby enhancing the ability to manage competitive advantage and corporate sustainability. As such, there exists a need to research the correlations between captured cost data to SR. Therefore, for the purposes of this project, the research problem states:

- *Given that improved knowledge of sustainability performance can enhance the management of competitive advantage, the operational costs of a chosen corporate strategy have not yet been applied to sustainability performance.*

5.2 Research Data

The secondary data set has been contributed to this research project by PwC. This data set comprises the results of over 180 firms that contributed to the PwC 2003 Global Forest and Paper Industry Survey. This survey data report on all associated costs of operations for a forest product manufacturer, and is delineated by operational sector. A vast amount of data exist with

the prime data set however the researcher received only the query on two different strategic representations. Table 8 outlines the primary tasks executed by the researcher over the course of this work.

The Woodlands Global Survey reports on over 400 cost activities that are functions of 15 groups of activities. This project utilized the Comparative Cost Summary of the Woodlands Report benchmarking survey data. Appendix I and II detail the content and definitions of what each reported cost element captures. Table 9 details the contents of the PwC benchmarking data set utilized in this analysis. Cells shaded yellow indicate the cost values from the comparative cost summary that were utilized in this analysis. Values in the grey-shaded cells were not used in this analysis and the value for the cell shaded green, *miscellaneous revenue*, was not used due to an inequity in reporting value between the two companies.

Table 9 – PwC Canadian Woodlands Benchmarking Data Set

	Environmentally-Focused	Cost-Focused
	CAD/cubic meter ($/m³)	CAD/cubic meter ($/m³)
Comparative Cost Summary	Company "A"	Company "B"
Hardwood		
Log and chip cost - FOB mill	29.12	22.29
Indirect costs		
Road costs	2.94	1.55
Silviculture and reforestation	0.21	1.04
Scaling	0.20	0.10
Miscellaneous Revenue	1.85	-
Produced cost before stumpage and overhead	30.83	24.92
Timber dues/stumpage/depletion		
Sawlogs		
Pulplogs and chips	1.96	0.52
Total timber dues/stumpage/depletion	1.96	0.52
Produced cost before overhead	32.79	25.44
Purchased wood cost		
Tree length	27.63	20.08
Cut-to-length		
Chips		
Total purchased wood cost	27.63	20.08
Total delivered wood cost before overhead	30.05	23.47
Overhead (planning and administration)		
Staff (permanent)	1.04	0.98
Staff (temporary and summer)	0.22	0.18
Forestry consultants	1.32	0.35
Total staffing costs	2.58	1.51
Vehicles, quads, snow machines	0.21	0.23
Helicopters	0.07	0.02
Travel	0.07	0.02
Training	0.01	0.01
Environmental initiatives (ISO, CSA, etc)	0.42	0.01
GIS period costs	0.09	0.04
Allocation of corporate costs	0.82	0.05
Other	0.82	0.20
Total planning and administration	4.90	2.11
Net delivered wood cost	34.95	25.58

From the primary database, representative data for two strategic directions of forestry operations, specifically a cost focus and environmental focus, were compiled. The representative data were compiled utilizing a multi-year compilation horizon and a multi-company inclusion in order to properly de-identify the data and incorporate a stable correlation. This query was then exported to an Excel™ database where it was then delivered to the researcher. The data detail each line item from the benchmarking survey and reported representative data for two types of companies, a cost-focused company and an environmentally-focused company. The companies were referenced as Company "A" and Company "B".

While cost data exist for a number of detailed elements in the benchmarking survey, the comparative cost summary was found to be a comprehensive synopsis of all the costs undertaken in the woodlands operation. Since all relevant costs are summarized in the comparative cost summary, the data from these cost items were used to correlate against the sustainability indicators, with the exception of the purchased wood cost and wood sales. The purchased wood cost was included in the correlations but not applied to cost due to the fact that it is an external product, which requires a more in-depth analysis of supplier operations and inputs. Wood sales have also been correlated and defined however no values were used in

modelling wood sales. This component will also require a more intensive analysis of contributing factors in order to properly assess the application of cost.

5.3 Research Correlations

The research method followed a logical approach where the definitions of each GRI indicator were applied against the definitions of cost items in the benchmarking survey data.

In formulating and utilizing assumptions to correlate these definitions, a deductive approach was followed where a clear and reasonable connection was identified between the captured cost and the reporting indicator. This test was conducted by identifying the critical component of the definition of the cost item, then subjecting it to the definition of the indicator value. For this project, the correlations between cost survey fields and the identified indicators relied exclusively in creating clear and strong connections between these definitions. The definitions for the cost survey fields and each GRI indicator allowed the researcher to formulate a clear connection of similarity. As such, these definitions support all correlations built between existing cost data and sustainability reporting indicators.

Table 10 provides the definitions of correlation between the reported cost and the sustainability reporting indicator. The table format first shows whether the reporting indicator is detrimental or beneficial to sustainability and provides the definition of the correlation between cost and indicator. This table also provides a short note regarding where additional research could be applied should the reporting company wish to “drilldown” or analyze an indicator to a greater level of depth. The correlations provided in this table were used to prepare the cost data for analysis.

5.4 Data Analysis

As noted earlier, the analysis of the GRI indicators only included those indicators that reflected a positive or beneficial externality for the reporting company. By applying the same analysis of cost to both the environmentally-focused company and the cost-focused company, we are able to gain a clearer picture of how sustainability may be impacted by these approaches. While negative or detrimental impacts may also exist with the reporting company, the reported cost data does not allow for insight into where these impacts may exist or at what level of cost the impact has incurred on the reporting company. Further, negative externalities are often linked with non-compliance which carries separate regulatory and operational costs that are not

reflected in the benchmarking data. Likewise, the externally incurred costs for log and chips, purchased wood, and wood sales were not analyzed in the data queries. The same beneficial indicators were applied to both company representations in order to examine the results without variance, focusing on the internal operational costs.

The analysis of data in this project involved the integration of compiled data from the benchmarking survey, representing the two differing strategic choices, namely a cost focus and an environmental focus. The analysis of the data set utilized cost reporting for both the environmentally-focused company and the cost-focused company.

Table 11 details the summary of the correlations between cost and sustainability indicator as defined previously. The definitions provided with the GRI guidelines and the PwC benchmarking data formulated logically-extrapolated assumptions regarding how correlations between cost elements and indicator definitions exist. These correlations remain defensible through logic and definition yet focus solely on the beneficial externalities, or positive indicators, of sustainability reporting. A company seeking to implement a sustainability report will require a more comprehensive approach.

5.5 Ethics Review

The Office of Research services at the University of Saskatchewan requires that all University sponsored research projects seek ethics approval from their governing body. The project description was summarized into a short report and submitted on March 24, 2004. This statement was received from the Acting Chair of the Behavioural Ethics Review Board, Dr. David Hay, on March 25, 2004:

- *Based on the information provided by you in your email of March 24, 2004, your project would be exempt from ethics review.*
- *Your project has been classified as a skill development activity and therefore not subject to ethics review. Further, your project involves the use of secondary de-identified data, which, as indicated in the Tri-Council Policy Statement, is not subject to ethics review.*

5.6 Expected Results

The anticipated result of the research follows three hypotheses. These hypotheses centre around the assumption that sustainability reporting will enhance the ability of a company to manage SCA, and that those companies that invest more in operational costs to satisfy sustainability requirements, will perform better on all sustainability indicators.

The three hypotheses are as follows:

h0: *Sustainability performance will show no definable pattern in the correlation to reported costs.*

h1: *A forestry company that sets environmental performance as an operational mission will outperform a cost-focused company consistently on all aspects of sustainability performance.*

h2: *A company that invests in environmental performance will outperform a cost-focused company in overall sustainability performance.*

6.0 Research Results

The results of the correlations of cost to sustainability show that there are clear differences in expenditures for firms following differing strategies. The correlations of cost to indicator show that each have strengths in different performance criteria.

Table 12 – GRI Indicator-Correlated Costs

Indicator	Environmentally Focused Related Cost/Reported Value ($/cubic meter)	Cost Focused Related Cost/Reported Value ($/cubic meter)	Survey Line Item
EC1	1.645233553	0	Miscellaneous Revenue
EC3	1.323626134	0.3490292	Forestry Consultants
EC4	1.323626134	0.3490292	Forestry Consultants
EC5	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
EC6	0.423231 71	0.009526278	Environmental Initiatives
EC7	0.423231 71	0.009526278	Environmental Initiatives
EC8	1.964851763	0.522270319	Sawlogs, Pulplogs and Chips
EC12	0.093493571	0.0437485	GIS Period Costs
EN3	0.347403852	0.255141053	Vehicles, Guards, Snow Machines, Helicopters, Travel
EN27	0.633348451	1.051341 79	Silviculture and Reforestation
EN31	1.323626134	0.3490292	Forestry Consultants
SO1	3.866714018	2.746347511	Road Costs, Silviculture and Reforestation, Scaling, Environmental Initiatives, GIS Period Costs
SO4	0.423231 71	0.009526278	Environmental Initiatives
SO5	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
SO13	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA1	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA2	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA3	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA6	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA8	0.009823456	0.010396476	Training
LA10	1.254145061	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA12	1.263972517	1.173737545	Staff (permanent), Staff (temporary and summer)
LA13	1.645510826	0.126456058	Allocation of corporate costs, Other
LA14	0.217405903	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA15	0.217405903	1.163341 07	Staff (permanent), Staff (temporary and summer)
LA16	0.009823456	0.010396476	Training
LA17	0.009823456	0.010396476	Training

Table 12 shows the related cost correlations to each indicator. In some cases, the indicator correlates to several cost items which provides for a larger representation of cost. This data is normalized to a cost per cubic meter of wood and represents the same task for both companies. These results show that the environmentally-focused company outperforms the cost-focused company in nearly all reporting criteria, except two. Silviculture and reforestation costs are higher for the cost focused company as are training costs. This table helps to illustrate where costs exist for each reporting company and which specific indicators correlate to cost items. The values represent the amount spent ($/m^3) on each of the associated sustainability indicators. The yellow shaded cells indicate cost of the few sustainability practices where the cost-focused company exceeds the environmentally-focused company in expenditure and subsequently outperforms the environmentally-focused company in those areas. The green shaded cell indicates that there is an inequity in the reporting values for this item.

Table 13 details the summary of each dimension of sustainability reporting and the correlated costs for each company. These totals show that, overall, the environmentally-focused company creates a greater level of beneficial externalities than the cost-focused company. For each dimension of sustainability performance, the environmentally-focused company outperforms the cost-focused company. These results show that the environmentally-focussed company outperforms the cost-focussed company only marginally for both environmental and social sustainability performance, but the economic performance is substantially higher.

Table 13 – Sustainability Dimension-Correlated Cost Summary

	Economic Total	Environmental Total	Social Total	Sustainability Total
Environmentally Focused	8.451443643	2.304378477	16.44275467	27.19857679
Cost Focused	2.447270845	1.660112044	14.55776649	18.66514938

*Utilizing the Comparative Cost Summary data from the PwC Benchmarking Survey. Excluding Purchased Wood Cost

Performance for the social dimension is 13% higher for the environmentally-focused company than for the cost-focused company. Performance for the economic dimension is 346% higher for the environmentally-focused company than for the cost-focused company. Performance for the environmental dimension is 43% higher for the environmentally-focused company than for the cost-focused company. These results also show that the total performance for the environmentally-focused company, as measured by these sustainability indicators, is over 45% higher than that for the cost-focused company.

Figures 2 and 3 show the results of cost correlations for each of the two differing strategies of Woodlands operations. Figure 2 provides a detailed breakdown by each indicator type stacked for each of the three sustainability dimensions for the cost focused company whereas Figure 3 provides this same breakdown for an environmentally focused company. This figure provides a good overview of the degree of contribution that each indicator provides as well as the differences of indicator composition between the two strategies. It is clear that while the total performance of each strategy provides a great deal of beneficial externalities, the performance of the environmentally focused company exceeds that of the cost focused company. Also, the diversity of externalities seems to be greater with the environmentally focused company, showing a greater number of reporting indicators than the cost focused company.

Figure 2 – Sustainability Representation for a Cost Focused Firm

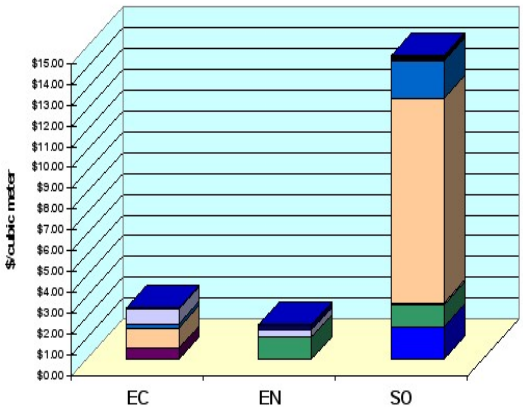


Figure 3 – Sustainability Representation for an Environmentally Focused Firm

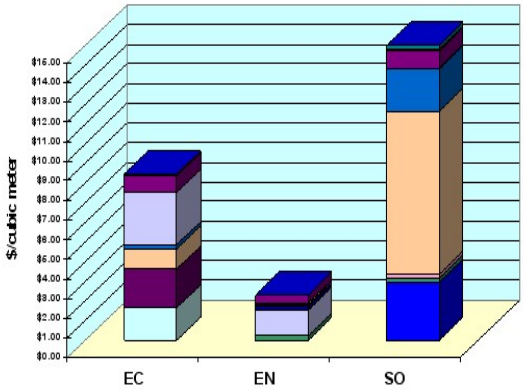
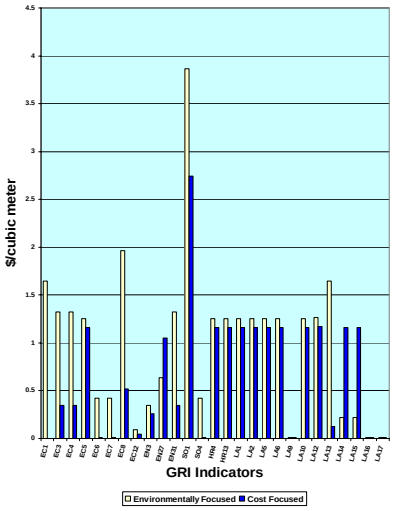


Figure 4 provides this result in a side-by-side format where performance on each noted GRI indicator is plotted to a cost per cubic meter for both the environmental-focused and cost-focused companies. This is an important visual tool as it allows for a comparison of the differing corporate strategies as it relates to the sustainability performance of each indicator. This graph shows that the environmentally-focused company is outperforming the cost-focused company on nearly all reporting indicators except the two noted previously, silviculture and reforestation costs and training costs. This graph also shows the substantial out-performance on economic

indicator EC1 by the environmentally-focussed company due to the lack of data reported by the cost-focused company on *miscellaneous revenue*. Apart from these anomalies, it is clear to see that the environmental company achieves a greater level of beneficial externality for each of the reporting indicators than does the cost focused company. The indicators where performance exceeds 50% include EN31, EC3, EC8, SO1, SO4 and LA13. This figure also helps provide insight into operations providing both companies insight into where indicator performance exists in operational performance.

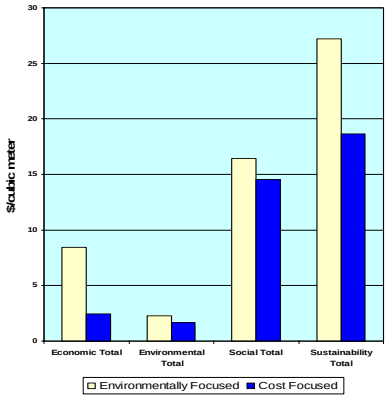
Figure 4 – Sustainability Comparison of GRI Indicators



And in order to gain additional insight into cost contributions to each of the sustainability dimensions, Figures 5 and 6 apply cost segmentation to each of the differing corporate strategies. These figures show the segmented allocation of costs to sustainability dimensions as well as the values reported for each. These pie charts further segment the social dimension cost correlations into labour practices and decent work, human rights, and society sub-dimensions.

The results of this side-by-side comparison when segmented to each reporting dimension also show that, as a whole, the environmentally-focused company exceeds the performance of the cost-focused company. As shown in Figure 7, the total performance for each of the differing strategies is remarkably beneficial but the environmentally-focused company exceeds that of the cost-focused company on most indicators.

Figure 7 – Sustainability Comparison of Dimensions



7.0 Discussion of Results

These results have been presented graphically in order to better visualize the differences between the reporting companies. In exploring these results, these figures will help clarify the sustainability performance position for each company.

It is important to recognize that the cost-focused company did not report any value for *miscellaneous revenue* whereas the environmentally-focused company reported $1.65/cubic meter. This difference is the sole reason that the performance in the economic dimension of sustainability is so much higher for the environmentally-focused company. If this indicator was not included in the analysis, the economic dimension would be similar in performance to the social and environmental dimensions, or about 15% to 40% higher. Due to this inconsistency, comparisons on the indicators that utilize *miscellaneous revenue* were not formed.

The performance for each of the differing strategies is remarkably close. With the exception of the few previously noted anomalies, the increased costs incurred by the environmentally-focused company seem to relate to an increased sustainability performance of approximately 20% to 25%. The results of correlations showed a difference in performance of nearly 46% however much of this, nearly 16%, was comprised of the large costs associated with *miscellaneous revenue*. However, for the noted indicators where the environmental companies substantially outperformed the cost-focused company, it is clear that the additional costs borne by the environmental company provide a much greater level of beneficial externality.

These results also show another important element in the sustainability performance of corporate strategy. The level of cost contributions from the environmentally-focused company is much higher for each indicator, providing a level of diversity in the composition of the performance of each sustainability dimension. This diversity or increased amount of contribution helps the environmentally-focused company to achieve a higher level of sustainability performance by achieving a high level of commitment to the performance on each indicator.

By examining the results, we can explore and test the validity of each of the hypotheses.

> ***h0:*** *Sustainability performance will show no definable pattern in the correlation to reported costs.*

Throughout the correlation process, a clear picture begins to form on which specific performance criteria noted by the GRI have important meaning and impact to operations. The relevance of each indicator builds the case for business, in that it shows a clear connectivity to the maintenance of an SCA. This reporting criteria itself provides a great deal of insight into what are critical issues in the effective management of operations. By correlating representative costs from operations to these indicators, we can begin to understand how performance on sustainability is linked to corporate strategy and how the differing cost results effect the overall sustainability performance of a company. More importantly, this analysis shows where each indicator contributes to sustainability and which costs comprise that level of performance. By identifying the specific costs that correlate strongly to sustainability performance, the reporting company can better understand their niche of operations and where their competitive advantage may be.

This is exemplified in the difference in performance between the two corporate strategies for many of the indicators. While the environmentally-focused company may be outperforming the cost focused company on indicators such as EN31, EC3, EC8, SO1, SO4 and LA13, the cost focused company performs well on most of the others and indeed outperforms the environmental company on LA16, LA17, LA9 and EN27. Explanations for this performance do not form a part of this research. Proper assignment would require insight and internal knowledge of operations in order to properly define why performance on all these noted indicators is so radically different.

The results of the correlations show that indeed there are clear patterns in the application of cost to sustainability indicators and that there are also clear differences in the application of cost between the two corporate strategies. h0 was not confirmed.

> ***h1:*** *A forestry company that sets environmental performance as an operational mission will outperform a cost-focused company consistently on all aspects of sustainability performance.*

This hypothesis was not confirmed. There existed no strict dominance in all aspects of sustainability performance. The cost-focused company achieved a higher level of sustainability performance than the environmentally-focused company on four noted indicators. These indicators relate to training and employee management and programs for restoring habitat. Again, to better understand this level of performance, additional research

into operations will be required to better understand why the cost-focused company outperformed the environmentally-focused company on these four indicators. h1 was not confirmed.

> ***h2:*** *A company that invests in environmental performance will outperform a cost-focused company in overall sustainability performance.*

This hypothesis was not confirmed but data suggests that a determinable pattern can be extracted that would support enhanced sustainability performance by an environmentally-focused company. Due to the inclusion of *miscellaneous revenue* in the analysis of data, there is a bias towards the environmentally focused company. The cost focused company did not report any value for miscellaneous revenue, thereby affecting the reporting indicator EC1. However, even when EC1 is removed from the data set, the environmentally focused company still achieves a higher level of sustainability performance than does the cost focused company. Also, the composition of costs that are external to operations have a large impact on the reported costs for purchased wood and wood sales and will also require additional insight into the components of these costs. h2 was not confirmed but it is assumed that additional research may show it holds true based on the inclusion of all operational costs.

8.0 Limitations and Further Research

For a reporting company seeking to correlate their reported Woodlands benchmarking cost data to a sustainability report, Table 9 provides the comprehensive overview of where further research can be provided in the reporting schematic of the GRI. The “drilldown” or more comprehensive analysis will require the insight of operations, and can be maintained as an internal management tool that houses all critical sustainability information. The reporting company can then formulate a report that follows the GRI framework, and possibly integrate the information into their annual reporting.

This research also shows that in order to skilfully apply a meaningful correlation of sustainability performance, additional insight into operations and the composition of costs is required to effectively report on all dimensions. A sustainability report works as an annual report, providing insight into the corporate sustainability of operational performance at a chosen point in time. A reporting company must cater this reporting to the actual data from operations, detailed where necessary. Indeed, even the GRI guidelines state that a consultative dialogue with stakeholders remains critical to forming a full social sustainability report. While the correlations in this research can be used to form a broad understanding of sustainability performance, a comprehensive survey and reporting program should be instituted by any company seeking to externally report these results.

This research solely focused on the beneficial externalities of the two differing corporate strategies as it relates to forestry Woodlands operations, but the detrimental externalities are as equally important to understand. As a tool for managing the competitive advantage, SR can provide a great deal of traceable information that can be used for external reporting and internal management.

The correlations between cost and indicator implemented for the purposes of this work only have relevance to the data set it was applied against. In order to gain insight into the performance of any particular company, this analysis will have to be repeated with detailed information from the reporting company. This will also allow the reporting company the opportunity to explore the detrimental externalities of operations during the analysis.

Many of the indicators detailed in the GRI framework did not have direct relevance to the reported costs in the Woodlands benchmarking survey. While these reported costs can provide

some broad-level insight into the sustainability performance of differing corporate strategies, the data cannot formulate a comprehensive sustainability report as framed by the GRI. Further research is required in order to comprehensively apply SR to any company.

It is also important to consider that sustainability performance may not be fully reflected in the reported costs. The GRI indicators used in the correlations of beneficial externalities may well have other contributing values that are not reflected in the Woodlands operations. Costs such as stakeholder management, investor relations, and marketing, to name a few, will need to be included in a comprehensive report on corporate sustainability.

It is also noted that the application of findings is limited to the countries in which the cost data was captured, specifically Western Canada. To conduct this model properly, a company should integrate social and environmental impacts of operations in countries and local regions where operations exist. The regulatory and stakeholder issues will vary depending on the country of operations for the reporting company.

9.0 Conclusions and Recommendations

It is clear from the results of this analysis, that a forestry company that invests in a greater level of environmental performance in their Woodlands operations creates a higher level of sustainability performance and beneficial externalities. What is not clear is how. Correlating operational costs to sustainability performance can be a valuable tool for resource management companies that endeavour to build strong stakeholder relationships, sound management practices, dependable employee management programs, and stronger public images. This study allows the reporting company to draw some broad level performance values that can be tracked into the future. Correlating this sustainability framework to the benchmarking survey data can show a company where its position in sustainability performance is relative to the reported cost base, bearing in mind that not all sustainability performance is reflected in operational costs.

It can also be concluded that while environmentally-focused companies seem to outperform cost-focused companies, the performance of both strategies is surprisingly close. The cost-focused company seems to have good performance in the key areas where employee skill and reforestation compliance are needed. This may signal that these companies value those components of operations and this leads to a portion of their SCA. These companies may wish to explore their performance in people-centred leadership and environmental performance. Likewise, the environmentally-focused company may seek to investigate their performance in contributions to social infrastructure and environmental capital. Indeed, there are many different areas where a reporting company could explore a more defined detail.

This research shows that there exists an inherent value to the manager in doing so. This value is created through an enhanced understanding of operations and how corporate strategy is reflected in sustainability performance. This is especially true for forestry companies where the resource management and investment timeframe can exceed the lifetime of a single working professional manager. This insight will allow managers to extend their strategic viewpoint and manage their competitive position further into the future. And by correlating this framework with the reported results of the benchmarking survey, a reporting company can create an annual tracking report that provides insight into competitive position for both operational costs and the management of SCA.

Tables, Figures and Appendices

Figure 1 – The "Stool Approach" to Sustainability and the Firm

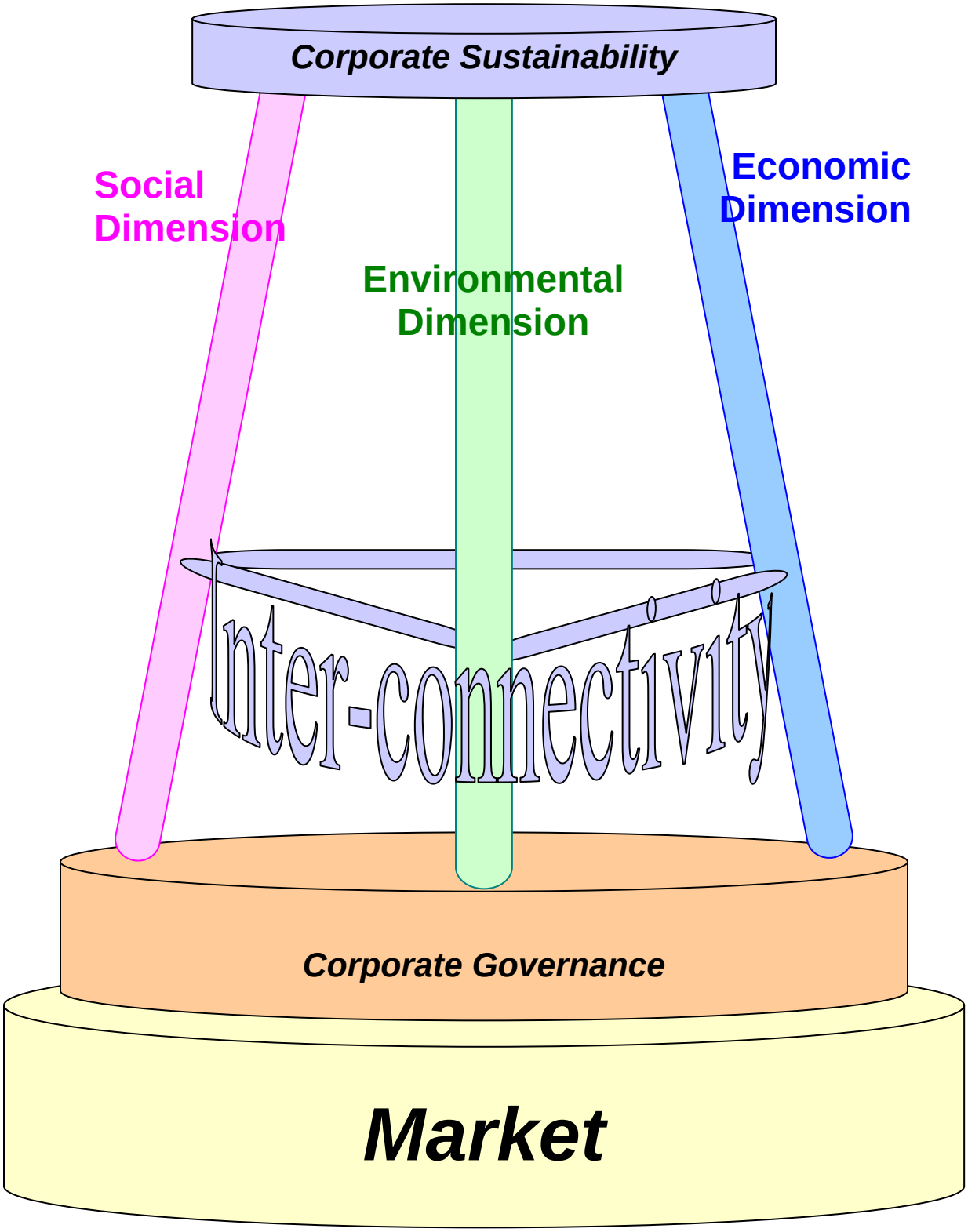


Figure 2 – Sustainability Representation for a Cost-Focused Company

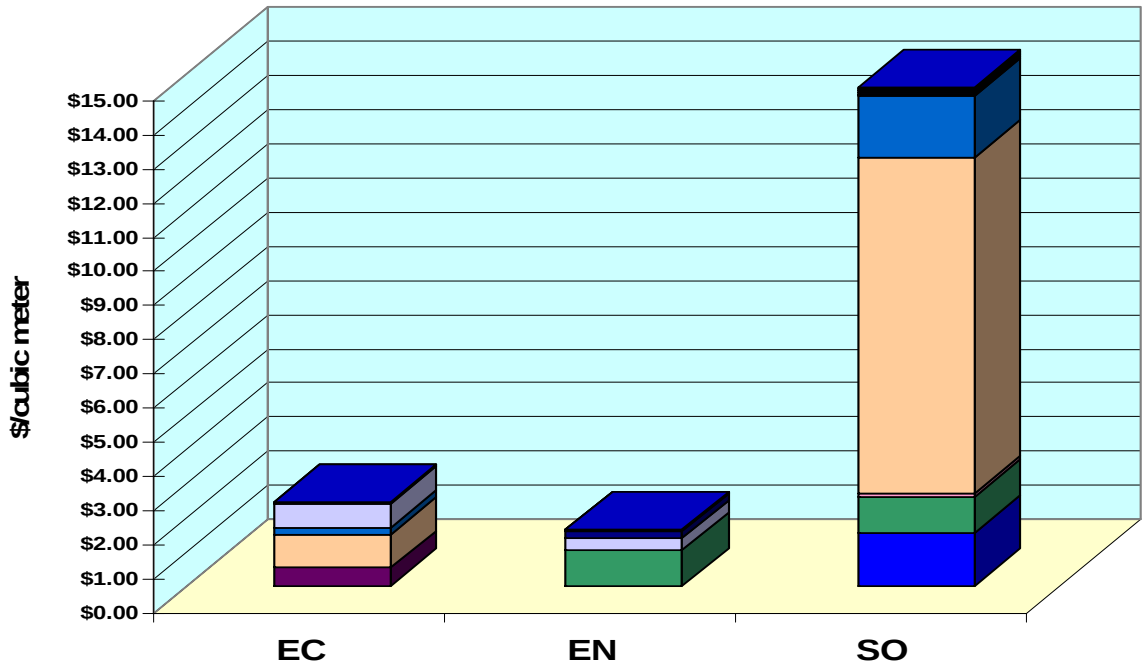


Figure 3 – Sustainability Representation for an Environmentally-Focused Company

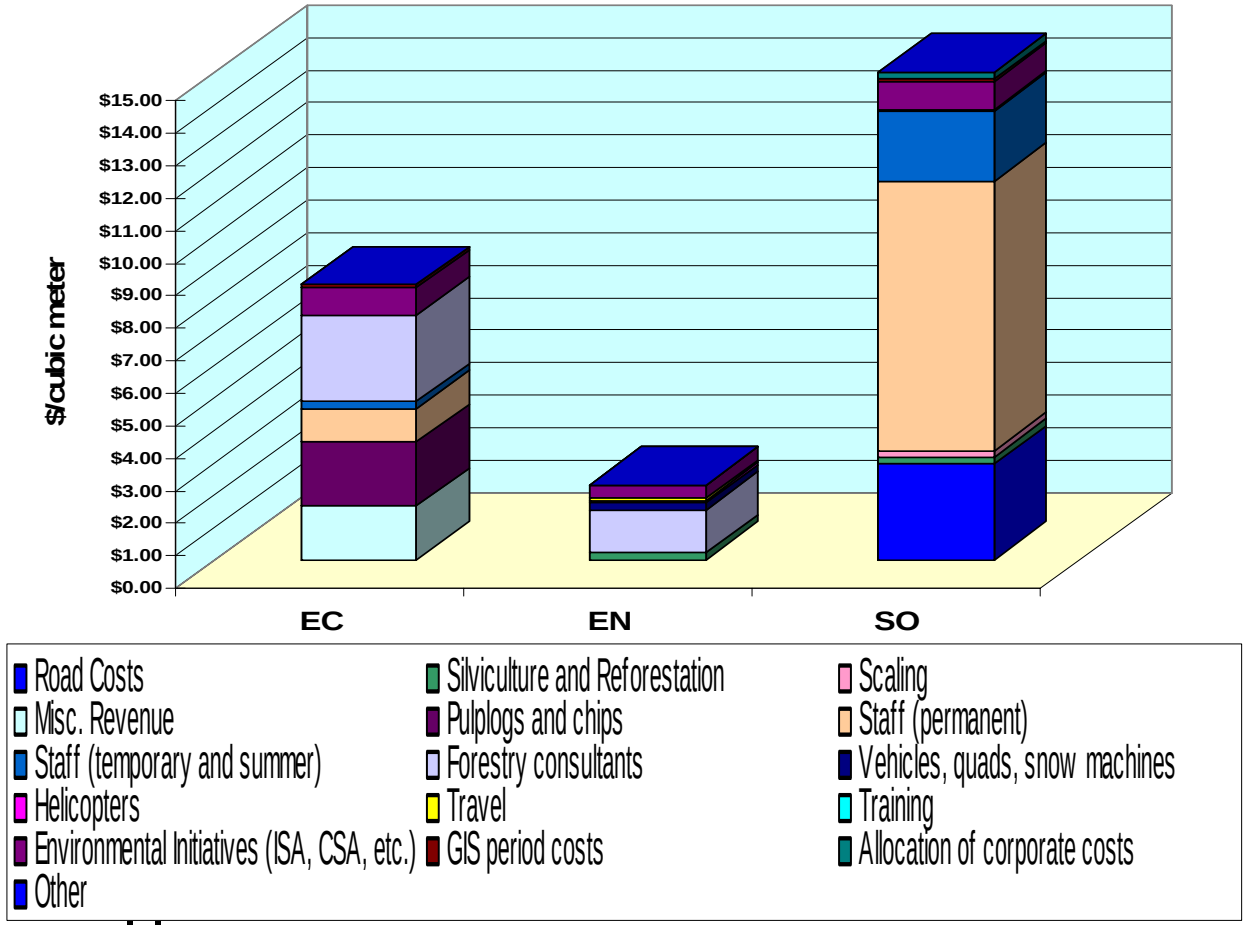


Figure 4 – Sustainability Comparison of GRI Indicators

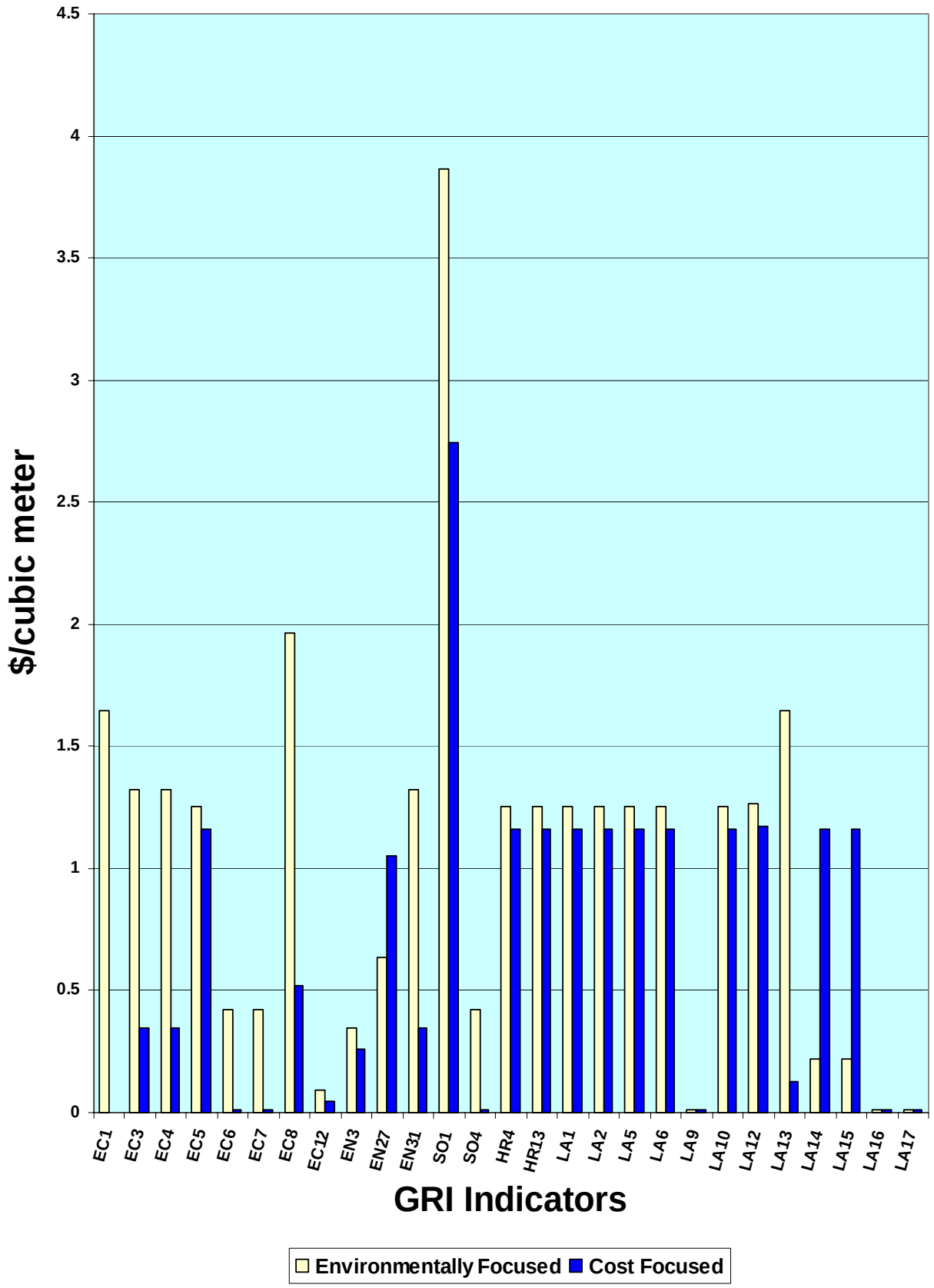


Figure 5 – Sustainability Values for a Cost-Focused Company

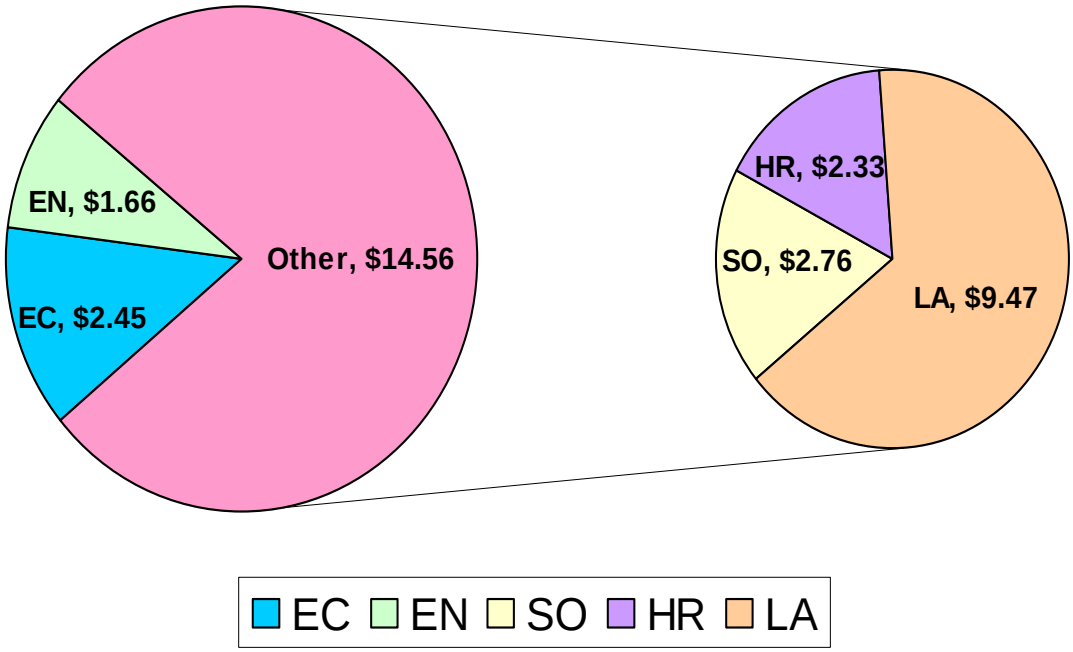


Figure 6 – Sustainability Values for an Environmentally-Focused Company

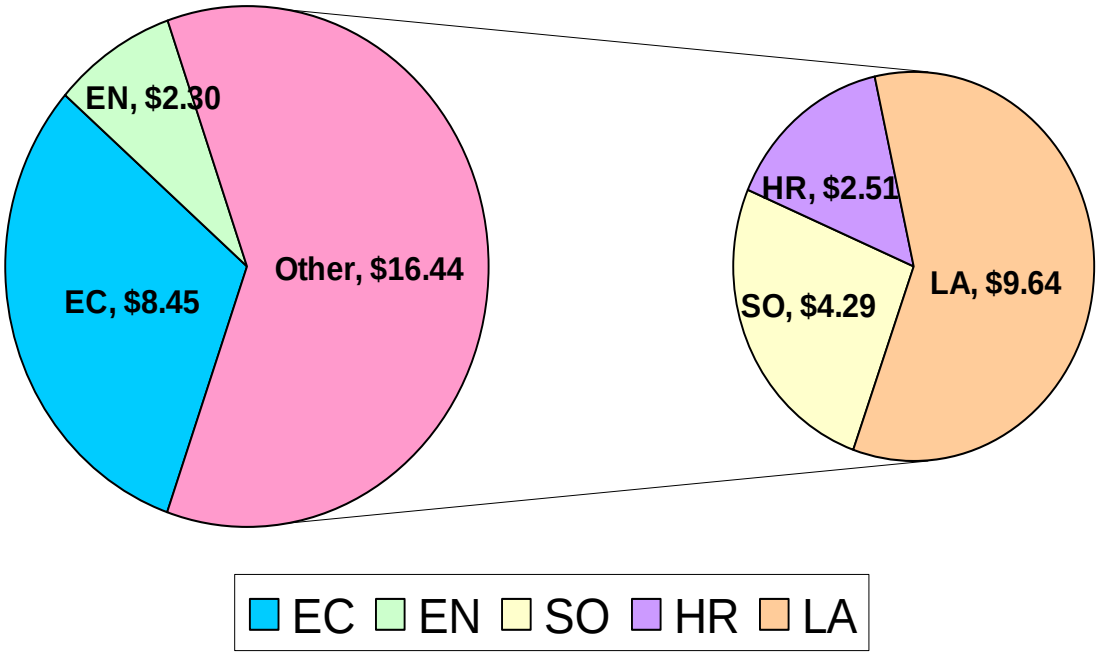


Figure 7 – Sustainability Comparison of Dimensions

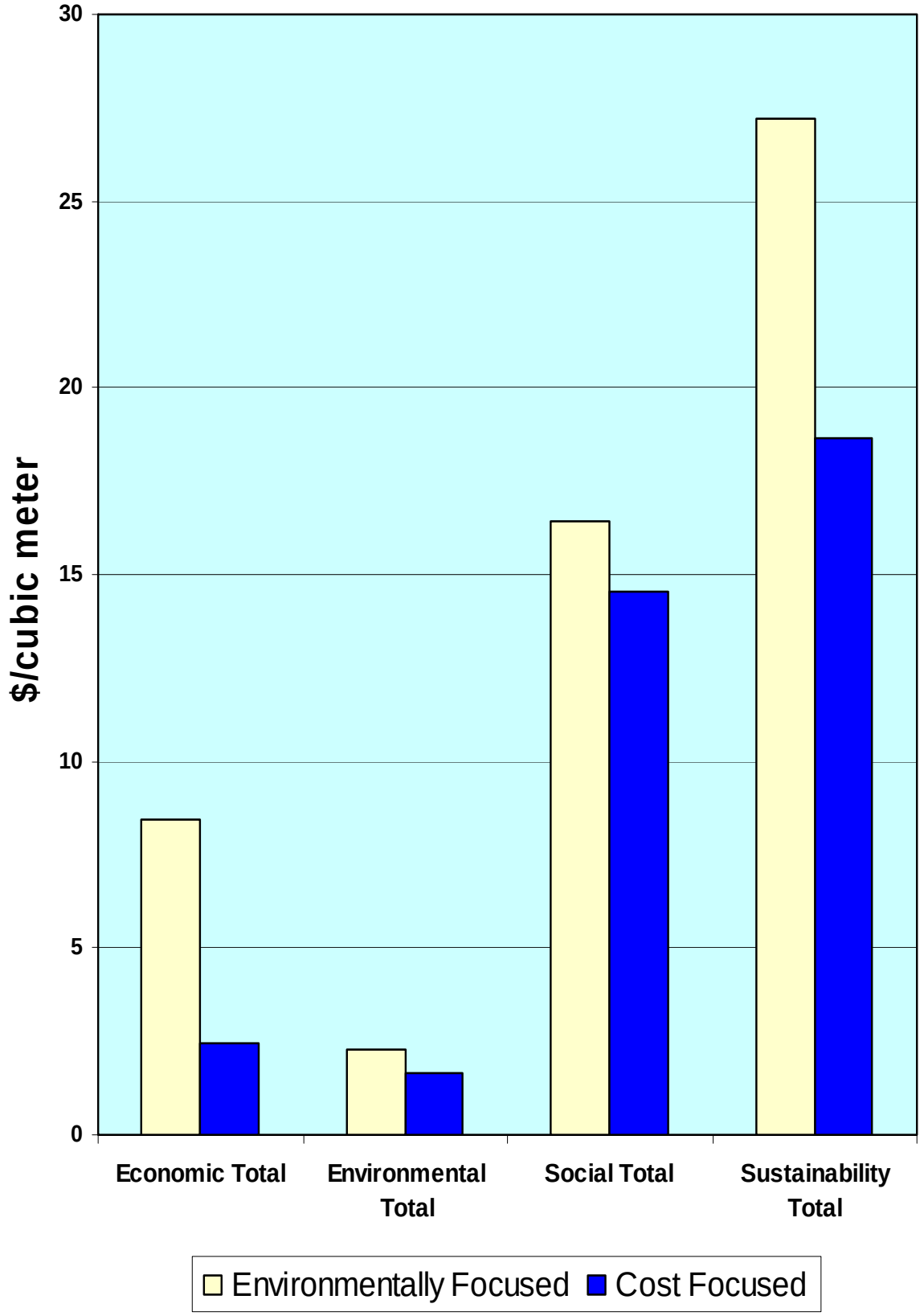


Table 1 – GRI Economic Sustainability Indicators

	Core Indicator	*Contributing Indicator*
Direct Economic Impacts		
Customers	EC1 - Net Sales EC2 - Geographic breakdown of markets	
Suppliers	EC3 - Cost of all goods, materials, and services purchased EC4 - Percentage of contracts that were paid in accordance with agreed terms, excluding agreed penalty arrangements.	EC11 - Supplier breakdown by organisation and country
Employees	EC5 - Total payroll and benefits (including wages, pension, other benefits, and redundancy payments) broken down by country or region	
Providers of Capital	EC6 - Distributions to providers of capital broken down by interest on debt and borrowings, and dividends on all classes of shares, with any arrears of preferred dividends to be disclosed EC7 - Increase/decrease in retained earnings at end of period	
Public Sector	EC8 - Total sum of taxes of all types paid broken down by country EC9 - Subsidies received broken down by country or region EC10 - Donations to community, civil society, and other groups broken down in terms of cash and in-kind donations per type of group	EC12 - Total spent on non-core business infrastructure development
Indirect Economic Impacts		
Public Sector	EC13 - The organisation's indirect economic impacts or major externalities associated with the reporting organisation's products and services	

Table 2 – GRI Environmental Sustainability Indicators

	Core Indicator	Contributing Indicator
Materials	EN1 - Total materials use other than water, by type EN2 - Percentage of materials used that are wastes (processed or unprocessed) from sources external to the reporting organisation	
Energy	EN3 - Direct energy use segmented by primary source EN4 - Indirect energy use	EN17 - Initiatives to use renewable energy sources and to increase energy efficiency EN18 - Energy consumption footprint of major products EN19 - Other indirect (upstream/downstream) energy use and implications
Water	EN5 - Total water use	EN20 - Water sources and related ecosystems/habitats significantly affected by use of water. EN21 - Annual withdrawals of ground and surface water as a percent of annual renewable quantity of water available from the sources EN22 - Total recycling and reuse of water
Biodiversity	EN6 - Location and size of land owned, leased, or managed in biodiversity-rich habitats EN7 - Description of the major impacts on biodiversity associated with activities and/or products and services in terrestrial, freshwater, and marine environments	EN23 - Total amount of land owned, leased, or managed for production activities or extractive use. EN24 - Amount of impermeable surface as a percentage of land purchased or leased. EN25 - Impacts of activities and operations on protected and sensitive areas. EN26 - Changes to natural habitats resulting from activities and operations and percentage of habitat protected or restored. EN27 - Objectives, programmes, and targets for protecting and restoring native ecosystems and species in degraded areas.
Emissions, Effluent and Waste	EN8 - Greenhouse gas emissions EN9 - Use and emissions of ozone-depleting substances EN10 - Total amount of waste by type and destination EN11 - Significant discharges to water by type EN12 - Significant spills of chemicals, oils, and fuels in terms of total number and total volume	EN28 - Other relevant indirect greenhouse gas emissions EN29 - All production, transport, import, or export of any waste deemed "hazardous" EN30 - Water sources and related ecosystems/habitats significantly affected by discharges of water and runoff
Suppliers		EN31 - Performance of suppliers relative to environmental components of programmes and procedures described
Products and Services	EN13 - Significant environmental impacts of principal products and services. EN14 - Describe and quantify where relevant. EN15 - Percentage of the weight of products sold that is reclaimable at the end of the products' useful life and percentage that is actually reclaimed.	
Compliance	EN16 - Incidents of and fines for non-compliance with all applicable international declarations/conventions/treaties, and national, sub-national, regional, and local regulations associated with environmental issues	
Transport		EN32 - Significant environmental impacts of transportation used for logistical purposes
Overall		EN33 - Total environmental expenditures by type

Table 3 – GRI Social Sustainability Indicators - Society

Society	Core Indicators	Secondary Indicators
Community	SO1 - Description of policies to manage impacts on communities in areas affected by activities, as well as description of procedures / programmes to address this issue, including monitoring systems and results of monitoring.	SO4 - Awards received relevant to social, ethical, and environmental performance
Bribery and Corruption	SO2 - Description of the policy, procedures/management systems, and compliance mechanisms for organisations and employees addressing bribery and corruption.	
Political Contributions	SO3 - Description of policy, procedures/management systems, and compliance mechanisms for managing political lobbying and contributions.	SO5 - Amount of money paid to political parties and institutions whose prime function is to fund political parties or their candidates.
Competition and Pricing		SO6 - Court decisions regarding cases pertaining to anti-trust and monopoly regulations. SO7 - Description of policy, procedures/management systems, and compliance mechanisms for preventing anti-competitive behaviour

Table 4 – GRI Social Sustainability Indicators – Human Rights

Human Rights	Core Indicators	Secondary Indicators
Strategy and Management	HR1 - Description of policies, guidelines, corporate structure, and procedures to deal with all aspects of human rights relevant to operations, including monitoring mechanisms and results HR2 - Evidence of consideration of human rights impacts as part of investment and procurement decisions, including selection of suppliers/contractors HR3 - Description of policies and procedures to evaluate and address human rights performance within the supply chain and contractors, including monitoring systems and results of monitoring	HR8 - Employee training on policies and practices concerning all aspects of human rights relevant to operations
Non-discrimination	HR4 - Description of global policy and procedures/programmes preventing all forms of discrimination in operations, including monitoring systems and results of monitoring	
Freedom of Association and Collective Bargaining	HR5 - Description of freedom of association policy and extent to which this policy is universally applied independent of local laws, as well as description of procedures/programmes to address this issue	
Child Labour	HR6 - Description of policy excluding child labour as defined by the ILO Convention 138 and extent to which this policy is visibly stated and applied	
Forced and Compulsory Labour	HR7 - Description of policy to prevent forced and compulsory labour and extent to which this policy is visibly stated and applied as well as description of procedures/programmes to address this issue, including monitoring systems and results of monitoring	
Disciplinary Practices		HR9 - Description of appeal practices, including, but not limited to, human rights issues. HR10 - Description of non-retaliation policy and effective, confidential employee grievance system (including, but not limited to, its impact on human rights)
Security Practices		HR11 - Human rights training for security personnel.
Indigenous Rights		HR12 - Description of policies, guidelines, and procedures to address the needs of indigenous people. HR13 - This includes indigenous people in the workforce and in communities where the organisation currently operates or intends to operate. HR14 - Description of jointly managed community grievance mechanisms. Share of operating revenues from the area of operations that are redistributed to local communities.

Table 5 – GRI Social Sustainability Indicators – Product Responsibility

Product Responsibility	Core Indicators	Secondary Indicators
Customer Health and Safety	PR1 - Description of policy for preserving customer health and safety during use of products and services, and extent to which this policy is visibly stated and applied, as well as description of procedures/programmes to address this issue, including monitoring systems and results of monitoring.	PR4 - Number and type of instances of non-compliance with regulations concerning customer health and safety, including the penalties and fines assessed for these breaches. PR5 - Number of complaints upheld by regulatory or similar official bodies to oversee or regulate the health and safety of products and services. PR6 - Voluntary code compliance, product labels or awards with respect to social and/or environmental responsibility that the reporter is qualified to use or has received.
Products and Services	PR2 - Description of policy, procedures/management systems, and compliance mechanisms related to product information and labelling.	PR7 - Number and type of instances of non-compliance with regulations concerning product information and labelling, including any penalties or fines assessed for these breaches. PR8 - Description of policy, procedures/management systems, and compliance mechanisms related to customer satisfaction, including results of surveys measuring customer satisfaction
Advertising		PR9 - Description of policies, procedures/management systems, and compliance mechanisms for adherence to standards and voluntary codes related to advertising. PR10 - Number and types of breaches of advertising and marketing regulations.
Respect for Privacy	PR3 - Description of policy, procedures/management systems, and compliance mechanisms for consumer privacy	PR11 - Number of substantiated complaints regarding breaches of consumer privacy.

Table 6 – GRI Social Sustainability Indicators – Labor Practices

Labour Practices and Decent Work	Core Indicators	Secondary Indicators
Employment	LA1 - Breakdown of workforce, where possible, by region/country, status (employee/non-employee), employment type (full time/part time), and by employment contract (indefinite or permanent/fixed term or temporary). LA2 - Net employment creation and average turnover segmented by region/country.	LA12 - Employee benefits beyond those legally mandated
Labour/Management Relations	LA3 - Percentage of employees represented by independent trade union organisations or other bona fide employee representatives broken down geographically OR percentage of employees covered by collective bargaining agreements broken down by region/country. LA4 - Policy and procedures involving information, consultation, and negotiation with employees over changes in the reporting organisation's operations (e.g., restructuring).	LA13 - Provision for formal worker representation in decision making or management, including corporate governance
Health and Safety	LA5 - Practices on recording and notification of occupational accidents and diseases, and how they relate to the ILO Code of Practice on Recording and Notification of Occupational Accidents and Diseases. LA6 - Description of formal joint health and safety committees comprising management and worker representatives and proportion of workforce covered by any such committees. LA7 - Standard injury, lost day, and absentee rates and number of work-related fatalities (including subcontracted workers). LA8 - Description of policies or programmes (for the workplace and beyond) on HIV/AIDS.	LA14 - Evidence of substantial compliance with the ILO Guidelines for Occupational Health Management Systems LA15 - Description of formal agreements with trade unions or other bona fide employee representatives covering health and safety at work and proportion of the workforce covered by any such agreements
Training and Education	LA9 - Average hours of training per year per employee by category of employee.	LA16 - Description of programmes to support the continued employability of employees and to manage career endings. LA17 - Specific policies and programmes for skills management or for lifelong learning.
Diversity and Opportunity	LA10 - Description of equal opportunity policies or programmes, as well as monitoring systems to ensure compliance and results of monitoring. LA11 - Composition of senior management and corporate governance bodies (including the board of directors), including female/male ratio and other indicators of diversity as culturally appropriate.	

Table 7 – External Impact of Indicator Performance

Economic	Environmental		Social			
EC1 +	EN1 -	EN18 -	SO1 +	HR1 +	PR1 +	LA1 +
EC2 +	EN2 -	EN19 +/-	SO2 +	HR2 +	PR2 +	LA2 +
EC3 +	EN3 -	EN20 -	SO3 +	HR3 +	PR3 +	LA3 +
EC4 +	EN4 -	EN21 -	SO4 +	HR4 +	PR4 -	LA4 +
EC5 +	EN5 -	EN22 +	SO5 +/-	HR5 +	PR5 -	LA5 +
EC6 +	EN6 -	EN23 -	SO6 -	HR6* +	PR6 +	LA6 +
EC7 +/-	EN7 -	EN24 -	SO7 +	HR7* +	PR7 -	LA7 -
EC8 +	EN8 -	EN25 -		HR8 +	PR8 +	LA8 +
EC9 +	EN9 -	EN26 +		HR9 +	PR9 +	LA9 +
EC10 +	EN10 -	EN27 +		HR10 +	PR10 -	LA10 +
EC11 +	EN11 -	EN28 -		HR11 +	PR11 -	LA11 +
EC12 +	EN12 -	EN29 -		HR12 +		LA12 +
EC13 +/-	EN13 -	EN30 -		HR13 +		LA13 +
	EN14 -	EN31 +		HR14 +		LA14 +
	EN15 +	EN32 -				LA15 +
	EN16 -	EN33 +/-				LA16 +
	EN17 +					LA17 +

A higher cost noted for the specific indicator would result in a:

- **+** Beneficial Externality
- **-** Detrimental Externality
- **+/-** Either – Dependent on the components being measured

Table 8 – Project Methodology Timetable

Project Task	Description	Completion Date
Project Profile Report	▸ Prepare a short profile of the purpose and implications of this research project for use by the project sponsor	May 30, 2004
Comprehensive literature research	▸ Comprehensive analysis of TBL/QBL reporting protocols and nature of secondary data set ▸ See Literature Review Report o Over 200 published works summarized and reviewed	June 25, 2004
Correlation of indicators to reported cost data	▸ An analysis of the existing correlations between cost data and performance indicators as well as a gap analysis where more information is required.	July 2, 2004
Development of assumptions and indicators for economic sustainability	▸ Attempt to fill information gaps ▸ Detailed presentation of hypotheses and tests that utilize existing literature to expand on correlations of economic indicators to reported cost data. ▸ Focus on GAAP principles and standard financial reporting ▸ Focus on GRI indicators ▸ July 7, 8, 9 in PricewaterhouseCoopers Edmonton offices	July 9, 2004
Development of assumptions and indicators for environmental sustainability	▸ Attempt to fill information gaps ▸ Detailed presentation of existing scientific knowledge regarding correlations of economic indicators to reported cost data. ▸ Focus on environmental regulations	July 16, 2004
Development of assumptions and indicators for social sustainability	▸ Attempt to fill information gaps ▸ Consultation with project advisors to integrate social indicators as well as make clear correlations to reported cost data. ▸ Focus on community integration	July 23, 2004
Formulation of Research Model	▸ Formulation of a digital model that can house costs data and provide logical pathways to reporting on sustainability. ▸ Focus on spreadsheet reporting	July 30, 2004
Formulation of Research Report	▸ Writing a comprehensive report detailing the research activities and results of the correlations and assumptions used to generate the model.	August 5, 2004
Research Project Presentation	▸ Preparation of a short project summary presentation that can be delivered upon request	August 16, 2004

Table 9 – PwC Canadian Woodlands Benchmarking Data Set

	Environmentally-Focused	Cost-Focused
	CAD/cubic meter ($/m^3)	CAD/cubic meter ($/m^3)
Comparative Cost Summary	*Company "A"*	*Company "B"*
Hardwood		
Log and chip cost - FOB mill	29.12	22.23
Indirect costs		
Road costs	2.94	1.55
Silviculture and reforestation	0.21	1.04
Scaling	0.20	0.10
Miscellaneous Revenue	1.65	-
Produced cost before stumpage and overhead	30.83	24.92
Timber dues/stumpage/depletion		
Sawlogs		
Pulplogs and chips	1.96	0.52
Total timber dues/stumpage/depletion	1.96	0.52
Produced cost before overhead	32.79	25.44
Purchased wood cost		
Tree length	27.63	20.08
Cut-to-length		
Chips		
Total purchased wood cost	27.63	20.08
Total delivered wood cost before overhead	30.05	23.47
Overhead (planning and administration)		
Staff (permanent)	1.04	0.98
Staff (temporary and summer)	0.22	0.18
Forestry consultants	1.32	0.35
Total staffing costs	2.58	1.51
Vehicles, quads, snow machines	0.21	0.23
Helicopters	0.07	0.02
Travel	0.07	0.02
Training	0.01	0.01
Environmental initiatives (ISO, CSA, etc)	0.42	0.01
GIS period costs	0.09	0.04
Allocation of corporate costs	0.82	0.06
Other	0.62	0.20
Total planning and administration	4.90	2.11
Net delivered wood cost	34.95	25.58

Table 10 –Correlation Definitions

Comparative Cost Summary Line Items	Correlated GRI Indicator and Definition
Indirect costs	
Road Costs	SO1: Costs relate directly to a net benefit to society by building the road and providing improved access. Drilldown: Assess the social value of the new road based on quality, location, cost and risk.
Silviculture and Reforestation	EN26: Costs relate to changes in natural habitats resulting from activities and operations and represent the percentage of habitat protected or restored. Drilldown: Assess specific area and type of land restored. EN27: Costs may relate to objectives, programmes and targets for protecting and restoring native ecosystems and species in degraded areas. Drilldown: Assess specific area and type of degraded and restored lands. SO1: Costs relate to the description of policies utilized to manage environmental degradation and impact mitigation. Drilldown: Assess and describe the land restoration/reclamation strategy used by the company.
Scaling	SO1: Costs relate to the implementation of environmental monitoring systems Drilldown: Assess as a monitoring component and apply segmented cost
Miscellaneous Revenue	EC1: Contributes to Net Sales Drilldown: Assess all components of net sales and apply cost (Activity Based Costing)
Sawlogs	EC8: Costs contribute to total taxes/stumpage paid, providing a net benefit to society. Drilldown: Determine stumpage fees paid to government that contributes to social equity.
Pulplogs and chips	EC8: Costs contribute to total taxes/stumpage paid, providing a net benefit to society. Drilldown: Determine stumpage fees paid to government that contributes to social equity.
Tree length, Cut-to-length, Chips	EC3: Costs of all goods, materials and services purchased. Drilldown: Assess actual dollar amount for the reporting company. EC4: Costs relate to % of contracts paid in accordance with agreed terms. Drilldown: Assess actual dollar amount for the reporting company. EC11: Costs can be segmented to provide information of supplier breakdown by country Drilldown: Assess the supplier demographics for the reporting company. EN15: Costs relate to the total % of reclaimable products sold or utilized. Drilldown: Assess and report on the utilization of fiber for the reporting company. EN31: Costs relate to the performance of suppliers relative to the reporting company's environmental programs and procedures Drilldown: Assess the performance of suppliers on the compliance and procedural targets.

Table 10 – Correlation Definitions (cont'd)

Comparative Cost Summary Line Items	Correlated GRI Indicator and Definition
Overhead (planning and administration)	
Staff (permanent, temporary and summer)	EC5: Costs relate to total payroll and benefits. Drilldown: Assess the segmented costs of wages, pensions, benefits, redundancy payments. HR4: Costs relate to policies preventing discrimination. Drilldown: Assess actual dollar amount spent on developing global policy that prevents all forms of discrimination in operations, including monitoring systems and results of monitoring. HR13: Costs relate to policies specific to indigenous people in the workforce. Drilldown: Assess actual dollar amount spent on developing policy and guidelines for addressing the needs of indigenous people in the workforce. LA1: Costs relate to breakdown of workforce. Drilldown: Assess actual dollar amount expended on employment by region/country, status, employment type, and by employment contract. LA2: Costs relate to net employment creation and average turnover. Drilldown: Assess actual dollar amount expended by region/country. LA5: Costs relate to practices on occupational accidents. Drilldown: Assess actual dollar amount expended on developing practices on recording and notification of accidents and diseases, and how they relate to the ILO Code of Practice. LA6: Costs relate to expenditures on health and safety committees. Drilldown: Assess actual dollar amount for committees comprising management and worker representatives and proportion of workforce covered by such committees. LA10: Costs relate to equal opportunities policy development. Drilldown: Assess actual dollar amount expended on developing policies, programs or monitoring systems to ensure compliance. LA12: Costs relate to benefits that may be provided beyond those that are legally mandated. Drilldown: Assess expenditures on additional benefits provided. LA14: Costs relate to ILO compliance. Drilldown: Assess actual dollar amount expended on substantial compliance with the ILO guidelines for Occupational Health Management Systems. LA15: Costs relate to employee health and safety agreements. Drilldown: Assess actual dollar amount expended on describing formal agreements with trade unions or employee representatives.
Forestry consultants	EC3: Costs relate to all goods, materials and services purchased. Drilldown: Assess actual dollar amount for the reporting company. EC4: Costs relate to percentage of contracts that were paid in accordance with agreed terms. Drilldown: Assess actual dollar amount for the reporting company. EN31: Costs relate to performance of suppliers relative to environmental programs and procedures described. Drilldown: Assess actual dollar amount for the reporting company.

Table 10 – Correlation Definitions (cont'd)

Comparative Cost Summary Line Items	Correlated GRI Indicator and Definition
Vehicles, quads, snow machines, Helicopters and travel	EC3: Costs relate to all goods, materials and services purchased. Drilldown: Assess actual dollar amount for each segment.
Training	LA9: Costs relate to training per employee. Drilldown: Assess actual dollar amount expended on training per year per employee by category of employee. LA12: Costs relate to benefits that may be provided beyond those that are legally mandated. Drilldown: Assess expenditures on additional benefits provided. LA16: Costs relate to programs for career management. Drilldown: Assess actual dollar amount for the reporting company. LA17: Costs relate to skills management and lifelong learning. Drilldown: Assess actual dollar amount for the reporting company.
Environmental Initiatives (ISA, CSA, etc.)	EN27: Costs relate to objectives and programs for protecting and restoring native ecosystems and species in degraded areas. Drilldown: Assess actual dollar amount for the reporting company. SO1: Costs relate to the description of policies utilized to manage environmental degradation and impact mitigation. Drilldown: Assess and describe the land restoration/reclamation strategy used by the company. SO4: Costs may relate to awards received relevant to social, environmental, and ethical performance. Drilldown: Assess actual dollar amount for the reporting company.
GIS period costs	SO1: Costs relate to the description of policies utilized to manage environmental degradation and impact mitigation. Drilldown: Assess and describe the land restoration/reclamation strategy used by the company. EC12: Costs relate to net external benefit for non-core business infrastructure. Drilldown: Assess market value of GIS data invested in.
Allocation of corporate costs	LA13: Costs relate to how management allocates corporate costs. Drilldown: Assess actual dollar amount for the reporting company.
Other	LA13: Costs relate to how management allocates corporate costs. Drilldown: Assess actual dollar amount for the reporting company.
Wood sales	EC1: Costs relate to total net sales. Drilldown: Assess actual dollar amount for the reporting company. EC2: Costs relate to the geographic breakdown of markets. Drilldown: Assess actual dollar amount for each segment of operations. PR2: Costs relate to a description of policies and management systems related to product information and labeling. Drilldown: Assess actual dollar amount for the reporting company. PR8: Costs relate to the description of policies and systems related to customer satisfaction and monitoring results. Drilldown: Assess actual dollar amount for the reporting company.

*Shaded cells are not utilized in cost correlations due to their external nature to the reporting company.

Table 11 – Survey Data Groups Correlated to GRI Indicators

PwC Woodlands Benchmarking Survey: Comparative Cost Summary Line Items correlated to Relevant GRI Indicators			
Comparative Cost Summary Line Items	***Environmental***	***Social***	***Economic***
Log and chip cost – FOB mill			
Indirect costs			
Road Costs		SO1	
Silviculture and Reforestation	EN26, EN27, EN33	SO1	
Scaling		SO1	
Miscellaneous Revenue			EC1
Produced cost before stumpage and overhead			
Timber dues/stumpage/depletion			
Sawlogs			EC8
Pulplogs and chips			EC8
Produced cost before overhead			
Purchased wood cost			
Tree length	EN15, EN31		EC3, EC4, EC11
Cut-to-length	EN15, EN31		EC3, EC4, EC11
Chips	EN15, EN31		EC3, EC4, EC11
Total delivered wood cost before overhead			
Overhead (planning and administration)			
Staff (permanent)		HR4, HR13, LA1, LA2, LA5, LA6, LA10, LA12, LA14, LA15	EC5
Staff (temporary and summer)		HR4, HR13, LA1, LA2, LA5, LA6, LA10, LA12, LA14, LA15	EC5
Forestry consultants	EN31		EC3, EC4
Total Staffing costs			
Vehicles, quads, snow machines	EN3		
Helicopters	EN3		
Travel	EN3		
Training		LA9, LA12, LA16, LA17	
Environmental Initiatives (ISA, CSA, etc.)	EN27	SO1, SO4	
GIS period costs		SO1	EC12
Allocation of corporate costs		LA13	
Other		LA13	
Total planning and administration			
Total delivered cost before sales			
Wood sales		PR2, PR8	EC1, EC2

*Shaded cells are not utilized in cost correlations due to their external nature to the reporting company.

Table 12 – GRI Indicator-Correlated Costs

Indicator	Environmentally-Focused ($/cubic meter)	Cost-Focused ($/cubic meter)	Survey Line Items
EC1	1.645233559	0	Miscellaneous Revenue
EC3	1.323626134	0.3490292	Forestry Consultants
EC4	1.323626134	0.3490292	Forestry Consultants
EC5	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
EC6	0.42323171	0.009926278	Environmental Initiatives
EC7	0.42323171	0.009926278	Environmental Initiatives
EC8	1.964851763	0.522270319	Sawlogs, Pulplogs and Chips
EC12	0.093493571	0.0437485	GIS Period Costs
EN3	0.347403852	0.259141053	Vehicles, Quads, Snow machines, Helicopters, Travel
EN27	0.633348491	1.05194179	Silviculture and Reforestation
EN31	1.323626134	0.3490292	Forestry Consultants
SO1	3.866714018	2.746347511	Road Costs, Silviculture and Reforestation, Scaling, Environmental Initiatives, GIS Period Costs
SO4	0.42323171	0.009926278	Environmental Initiatives
HR4	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
HR13	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
LA1	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
LA2	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
LA5	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
LA6	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
LA9	0.009823456	0.010396476	Training
LA10	1.254149061	1.16334107	Staff (permanent), Staff (temporary and summer)
LA12	1.263972517	1.173737545	Staff (permanent), Staff (temporary and summer)
LA13	1.645510826	0.126496098	Allocation of corporate costs, Other
LA14	0.217405903	1.16334107	Staff (permanent), Staff (temporary and summer)
LA15	0.217405903	1.16334107	Staff (permanent), Staff (temporary and summer)
LA16	0.009823456	0.010396476	Training
LA17	0.009823456	0.010396476	Training

*Yellow shaded cells indicate superior performance for the cost-focused company. Green shaded cell was not used in this analysis due to inequity.

Table 13 – Sustainability Dimension-Correlated Cost Summary

	Economic Total	Environmental Total	Social Total	Sustainability Total
Environmentally-Focused	8.451443643	2.304378477	16.44275467	**27.19857679**
Cost-Focused	2.447270845	1.660112044	14.55776649	**18.66514938**

**Utilizing the Comparative Cost Summary data from the PwC Benchmarking Survey. Excluding Purchased Wood Cost*

Appendix I

Review Paper

The Global Reporting Initiative Sustainability Reporting Guidelines

W. Graham Stephens

Guidelines

- Driven by higher standards of accountability and increasing dependence on wide-ranging, external multi stakeholder networks that form a significant part of organizational practice.
- Driven by trends:
  - Expanding globalization – expansion of global capital markets
  - Search for new forms of global governance – international reporting on global practice
  - Reform of corporate governance – capital vs. talent
  - Global role of emerging economies – tightly linked global supply chains are spreading common management practices into all segments of the value chain.
  - Rising visibility of and expectations for organizations – increased communication from internet and public documents
  - Measurement of progress toward sustainable development
  - Governments' interest in sustainability reporting
  - Financial markets interest in sustainability reporting
  - Emergence of next-generation accounting
- Benefits include:
  - performance measurement in a global fast-paced economy where corporate objectives are more clearly defined
  - reporting builds, refines and continually refines stakeholder engagement
  - Transparency and open dialogue about performance, priorities and future sustainability strengthen the partnerships of stakeholders, helping build trust.
  - Vehicle for linking typically discrete and insular functions of the corporation.
  - Reporting process highlights internal threats and market opportunities.
  - Sharpens management's ability to assess the organization's external contributions to natural, human and social capital – "sustainability value proposition" which strengthens the "license to operate"
  - May reduce volatility and uncertainty in share price for public firms as well as reducing the cost of capital by avoiding major swings in investor behaviour caused by untimely or unexpected disclosures.
- Long term goal is to develop "generally accepted sustainability principles".
- Primary goal is to contribute to an ongoing stakeholder dialogue that influences the decisions of both the reporting company and the involved stakeholder.
- Reports on a higher level of comparability, consistency and utility.
- Smaller firms can implement an incremental approach
- GRI consists of:
  - The Guidelines – broad guidelines
    - Sector Supplements – if available
    - Issue Guidance Documents – if preferred (GRI offers some models)
    - Technical Protocols – on indicator measurement and definitions
- Core indicators – relevant to most stakeholders and reporting organizations
- Additional indicators
  - represent a leading practice
  - Provide information specific to reporting company stakeholders
  - Deemed worthy of further testing
- Flexibility in application
- Increased transparency = increased coverage = increased structure
- Recommends to time reporting with other reporting disclosures – move to "real-time"
- Publish a single integrated annual report – in parallel with financial reporting
- Ensure credibility of the report – builds trust, engage stakeholders

11 Reporting Principles

- Transparency – full disclosure of the process, procedures and assumptions in report preparation are essential to credibility; centerpiece of accountability.
- Inclusiveness – systematically engage stakeholders to help focus and continually enhance the quality of reporting; address diverse needs.
- Auditability – data should be recorded, compiled, analyzed and disclosed in a way that external auditors can attest to validity.
- Completeness – all material information in the report should be consistent with the declared boundaries, scope and time limit.
  - 3 dimensional
    - operational boundary dimension – based on financial control, legal ownership, business relationships
    - scope dimension – defining the indicators used for energy use, health and safety, etc.
    - temporal dimension – complete within reference to a specified time period
- Relevance – the degree of importance assigned to a particular aspect, indicator and represents the threshold at which such information becomes significant enough to be reported
- Sustainability context – place organizational performance in a larger context of sustainability
- Accuracy – the degree of exactness required for a high degree of confidence
- Neutrality – avoid bias in the selection and presentation of information and provide a balanced account of performance
- Comparability – maintain consistency in the boundary and scope and disclose change
- Clarity – make information available in a manner that is responsive to a maximum number of users while maintaining suitable levels of detail.
- Timeliness – should provide information on a regular schedule that meets user needs and comports with the nature of the information itself.

Reporting Notes

- Boundaries – match the scope of the report to the “corporate footprint”
- Use of technical protocols – use GRI wherever possible otherwise carefully define
- Metrics – use generally accepted international metrics using standard conversions
- Times frames and targets – enable the user to understand current and future trends
- Absolute/normalized data – present in absolute terms and use ratios or normalized as complementary
- Data consolidation and disaggregation – determine appropriate level of data consolidation and present in terms relevant to stakeholders
- Graphics – can enhance quality of report but do not use to detract or mislead the interpretation of data
- Executive summary – draw on only material from report and be consistent with report

Report Content

- Vision and Strategy – reporting organization’s sustainability vision and corporate strategy
  - Statement from the organization regarding contribution to SD.
  - Statement from the CEO.
- Profile
  - Organizational Profile
  - Report Scope
  - Report Profile
- Governance Structure and Management Systems
  - Structure and Governance

- Stakeholder Engagement
- Overarching Policies and Management Procedures

- GRI Content Index Table
- Performance Indicators
  - Integrated Indicators – defined through stakeholder consultation and specific industry needs
    - Systemic Indicators – activity of the org. to the larger society
    - Cross-cutting indicators – directly relate two or more dimension of social, economic or environmental performance as a ratio
  - Economic Performance Indicators
    - Direct Impacts – to stakeholders
    - Indirect Impacts – externalities on communities

Indicators

	Category	Aspect
Economic	**Direct Economic Impacts**	Customers Suppliers Employees Providers of capital Public sector
Environmental	**Environmental**	Materials Energy Water Biodiversity Emissions, effluent and waste Suppliers Products and services Compliance Transport Overall
Social	**Labor Practices and Decent Work**	Employment Labor/management relations Health and safety Training and education Diversity and opportunity
	Human Rights	Strategy and management Non-discrimination Freedom of association and collective bargaining Child labor Forced and compulsory labor Disciplinary practices Security practices Indigenous rights
	Society	Community Bribery and corruption Political contributions Competition and pricing
	Product Responsibility	Customer health and safety Products and services Advertising Respect for privacy

Appendix II

Discussion Paper

The Dynamics of Sustainability Dimensions: Correlating Sustainability Reporting to Previously Collected Cost Data

W. Graham Stephens

Sustainability reporting can enhance value in the forest industry. For consumers, stakeholders, land managers, and private industry. Through sustainability reporting, common critical values can be tracked to the corporate performance of a given firm or project, enabling clarity regarding the operations and its impacts on society. The three facets of sustainability reporting that have been modeled are environmental, social, and economic, where each form a component of the performance of the firm. These models have applied common indicators of performance to the operations of the firm in order to generate traceable reporting parameters. It will be necessary to develop a comprehensive understanding of these generic indicators in order to form an understanding of how they best correlate to the forestry industry specifically. In addition, this knowledge will allow for a development of other indicators that strongly represent the specific operations in forestry and how they can best be applied to sustainability reporting.

It is important to note that some scholars are recognizing a fourth dimension to sustainability reporting: corporate governance. This fourth dimension encompasses the critical importance of management skill and experience as well as how the firm's resources are controlled. In regards to sustainability, this element is being looked as another separate and internal component of the operations of a firm and how accountability and due-diligence in operations can affect society. However, in the focus of this research, it is assumed that corporate governance is a component of each of the three dimensions and that its impact is integrated into these dimensions where applicable. Corporate governance then becomes a function of each of the sustainability dimensions and is a component of the firm's operations that is taken into account when addressing due-diligence and management skill.

First, we explore the meaning of sustainability and how it is applied in the forest industry. It is important to note that the tenets of forest management are based on a sustainable wood supply and the management of growth and yield parameters to best achieve a harmony between social, environmental and economic sustainability of the resource. As such, sustainability has an application every component of operations in the forest product value chain. Sustainability itself becomes the management of operations in such a way that there are no adverse impacts on society in the future. The endeavour to find a harmony in operations that satisfies each critical societal value while maintaining maximum return on investments.

By clarifying the meaning of sustainability through a list of evolving yet comprehensive indicators, the meaning of sustainability will be addressed through the reported aspects of each indicator. Sustainability performance will become a function of these indictors and how well a

source project or corporation performs on them over time. While a static report may give insight into general impacts at a given time, it is crucial that the reporting be implemented periodically in order to provide insight into performance. As such, more than one sustainability report will be required in order to develop a measure of performance and change.

For a firm to achieve sustainability, they must be continually evolving their operations to minimize certain impacts and maximizing certain benefits. These impacts can be monitored as performance utilizing indicators as measures. These measures report a static point in time. In order to benchmark the results against performance, and other firms in the industry, it will be necessary to form a multi-year sustainability report to fully capture performance trends. Benchmarking and continuous improvement implies that several iterations of the sustainability report will be required to formulate a full understanding of the impacts on, and benefits from, sustainable operations.

To develop a good understanding of how each dimension will be represented by indicators, the framework on indicators provided by the Global Reporting Initiative will be drawn upon. This set of indicators clearly defines each of the three systemic dimensions of sustainability and provides a comprehensive viewpoint from which to begin to apply to the forest industry. Further defining specific indicators for the forest industry can occur once a full understanding of the framework has been established. These indicators have been reviewed in general in the project proposal and will be used to create a working model through the course of this work.

This model will also be used to correlate the indicators to the previously reported cost data. This cost data exists as a database of clients that participated in the PricewaterhouseCoopers Forestry Benchmarking Survey. These reported costs will be accompanied by a definition of what contributes to the cost and the reasons for the expenditure. This definition can then be correlated against the set of indicators in order to utilize this cost data to drive the sustainability report. All costs will be accounted for and where current and existing indicators exist but do not qualify each cost item, a new set of indicators will be theorized about how these costs correlate to a particular dimension of sustainability. This data set exists from 1997 to 2003 and can be used to formulate models applied to each reporting period, providing for a comparable result across the six year period. All actual numbers used will represent the averages for all firms that participated in the survey. In this way, the data will provide the highest connectivity to a real operational setting as well as maintain the anonymity of the participants.

The critical result of sustainable forest resources requires that massive investments and expenditures into monitoring and regeneration are undertaken. These activities contribute in direct and indirect ways to the achievement of a sustainable forest resource. However, these activities are not directly correlated to both resource and corporate sustainability. This research will attempt to do just that. By applying the costs of previously reported activities in the forest product supply chain to specific indicators of sustainable performance, the forest industry can better understand the complex relationships that arise in searching for the adaptive harmony between social, environmental and economic performance in forest resource sustainability.

The current state of knowledge regarding forest resource environmental sustainability will formulate the prime component of the environmental dimension. This component is well documented through science and applied ecology and will require few assumptions in order to develop defensible and meaningful indicators. Environmental indicators of sustainability in the forest industry will be well documented and drawn upon to formulate a component of this reporting dimension. It will provide the management and stakeholders of the firm, as well as the public, to formulate a more comprehensive picture of the effects of their operations. In forestry, this component has long been under scrutiny. As a result, Canada has an intensive forest management plan focused on a sustainable natural resource. Environmental policy and regulation in the forest industry drives a large part of sustainability efforts. Reforestation and impact mitigation form part of the regulated policy guiding forestry operations and, as such, will form another component of the sustainability impacts for this dimension. This process provides a consolidated report that demonstrates that the investments and efforts undertaken to enhance environmental sustainability, minimize environmental degradation, and mitigate environmental impacts has generated a net benefit, or a net loss, to society when benchmarking it to a natural state. By generating traceable reporting for these environmental indicators, a better understanding of the effects on environmental sustainability can be gained by all stakeholders.

Defining the social sustainability dimension will also largely draw upon the indicators detailed by the GRI. These indicators account for human and worker rights as well as the integration of indigenous peoples. For the Canadian forest industry, the integration of First Nations is a critical component of multiple resource or intensive land management. Integrating the cultural interests into forest management planning will therefore form a component of this dimension as well as formulating a more representative reporting schematic that integrates the issues and concerns of all land stakeholders. The value this provides is a consolidated report that represents the true issues and social concerns regarding the forest industry that can then be used as a periodic

reporting mechanism on progress and integration. Progress towards certain goals, such as provisions for traditional hunting on managed lands, can then be included as an indicator of sustainable integrated cultural management and included as part of the reporting structure. In this way, the report provides for a common recognition of social values and concerns. By recognizing these items and reporting on performance through time, the firm can show how their operations are contributing to the maintenance of social values and customs as well as recognize how operational decisions impact this value system.

Economic performance indicators can be assumed to be standardized across corporations. The measures of economic or financial performance are easily represented by ROI, EBITDA, COGS, and other financial techniques such as forecasting and valuation. These techniques are standard in their application and meaning and will form a component of this dimension. The indicators chosen for this dimension will represent how the firm performs in managing their resources and how sustainable this performance is. Research will again focus on the connections between current reported forest industry costs, from the benchmarking survey data, and current indicators. Reporting on this dimension allows the firm to better understand the cost of operations and the impact these activities have on the long-term sustainability of the firm's competitive advantage as best met through economic performance. There is clearly some trade-offs that can occur between each dimension and the tendency to focus on economic performance often outweighs the other dimensions. The economic impacts on society from the operations of a forest industry can be sizable and can be captured as reported values representing stated indicators. These societal benefits, or costs, will form another component of this dimension.

Sustainability will be defined through the performance of indicators in each dimension as they pertain to renewable resource management. In this way, it can be assumed that all operations of a firm in the forest industry have some impact on a specific dimension of sustainability. The report will consolidate the correlations of cost to indicators as well as introduce industry-specific indicators for each dimension, where necessary.

Each dimension will formulate its own set of indicators that quantify the activities by relating them to sustainability performance. The trade-offs between each dimension will be more clearly identified by the impacts to the indicators specifically. The net benefit or loss to the performance of each indicator, in relation to its contribution to the sustainability of the given dimension, will be tracked as a reportable item through the time frame of the previously collected cost data.

Clearly, the applicability of this model will highly depend on the relevance of indicators to the firm operating in the forest industry. This model will take the two existing reporting schematics and develop defensible and meaningful assumptions that correlate the two together strongly. By incorporating the GRI sustainability reporting framework with an existing cost database, the PwC benchmarking survey, the resulting report model can be applied to the results of firms that participate in the survey. This provides additional insight to operations and stakeholder management issues and will note specific areas where the firm would have to apply further research in order to properly assess.

Appendix III

PwC Global Forestry Benchmarking Survey – Woodlands Definitions

Canadian Forest Industry - Woodlands

PwC National Benchmarking Survey – 2002

Definitions/Explanation of Terms Used

These appear in the order as they do in the questionnaire. Please follow this guidance as you complete the questionnaire to improve the consistency between participants.

Line	Item	Definition/Explanation
All	**2002 Year**	Please enter data for the 2002 calendar year. If your internal information systems do not allow a calendar year analysis, please enter data for the annual period which is as close as possible to the 2002 calendar year.
10001	**Average Tree Size**	Calculate the average tree size for softwood based on only merchantable softwood trees. Calculate the average tree size for hardwood based on only merchantable hardwood trees.
10002	**Average Tree Stocking**	Include all merchantable tree species in the calculation of m3 per hectare. Blocks which are principally softwood, should be included in the softwood category but should also include merchantable hardwood trees within the total m3 per hectare calculation. Blocks which are principally hardwood, should be included in the hardwood category but should also include merchantable softwood trees within the total m3 per hectare calculation.
10011 to 10039	**Produced Wood**	Includes wood from company controlled government tenures and company owned private lands. The m3 reported should represent the total volume of logs shipped to final destination (company log yards or other locations). Where logged volumes differ from delivered volumes for the year, please record the delivered volume and only include costs in this survey related to the delivered volume. Assume bark on and include volumes shipped below government utilization standards.
10011 10051	**Tree Length**	Any logs exclusive of cut-to-length or commercial thinning logs.
10012 10052	**Cut-To-Length**	Logs processed to random length including 8' bolts. Logs should be between 8 feet and 20 feet in length and should not need any further bucking before they are transferred to the mill.
10013	**Commercial Thinning**	Logs from commercial thinning operations.
10021 10061	**Sawlogs**	Logs intended to be used to produce lumber.
10022 10062	**Pulp Logs, Chips and Wafers**	All logs, chips and wafers other than sawlogs. Convert chip quantities to m3 equivalent.
10051 to 10079	**Purchased Wood**	Wood that is purchased from other parties that has been obtained from either private lands not owned by the company or from government tenures that are not controlled by the company. The m3 reported should represent the total volume of logs shipped to final destination (company log yards or other locations). Assume bark on and include volumes shipped below government utilization standards.

Line	Item	Definition/Explanation
20001 to 20199	**Operating Cost Summary**	All amounts in this section should be recorded in Canadian dollars. The dollar amounts recorded should represent the costs with respect to each particular activity for the produced volume amounts except for the purchased wood costs that should be for the purchased volumes (e.g. the felling and bunching costs for softwood-tree length wood on line 20001 should be for the produced softwood volume indicated on line 10011).
20001	**Felling and Bunching**	All felling and bunching costs including contractor profit margins if applicable. For stump-to-dump contractors, please allocate their costs between lines 20001, 20002, 20003 etc. on a best estimate basis.
20002	**Skidding**	Skidder or equivalent forwarding costs including contractor profit margins if applicable.
20003	**Delimbing & Processing**	Stumpside or roadside and including contractor profit margins if applicable.
20004	**Forest camps**	Include lodging, food and maintenance costs less any revenues received for the services provided.
20005	**Logging Overhead**	Do not include planning and administration overhead costs which are included in lines 20101 to 20129. Include costs such as mobilization, logger accounting/insurance/risk allowance, communication equipment, miscellaneous supplies, protection and security equipment and permits.
20006	**In Block Roading**	All spurs, stubs and landing development of a temporary or permanent nature within the block boundaries. Exclusive of mainline roads which pass through the blocks (mainline road costs are captured in 20041).
20007	**In Block Roading - Reclamation**	Costs for any reclamation work on all spurs, stubs and landings within the block boundaries.
20008	**Other**	Any other direct costs of harvesting phases that have not been included in lines 20001 to 20007 including items such as environmental protection costs, miscellaneous equipment rentals etc.
20010	**Loading**	Includes estimated costs of loading phase for self loading truck systems. All other hauling costs for self loading trucks should be included in the hauling line.
20011	**Hauling**	Direct costs associated with hauling the timber to the log yard or booming ground.
20012	**Log Haul Administration**	Includes costs for haul administration, loader moves and tow assistance.
20021 to 20029	**Bush Chipping Costs**	Includes all costs for chips which are manufactured in a remote location. These costs should be for the volume identified in line 10014.
20041	**Road Costs**	Combination of period road building costs, road maintenance costs, current period capital road amortization and road use fees. If your company shares the costs of building or maintaining roads with another organization, include the cost recovery or road usage revenue in miscellaneous revenue in line 20049.

Line	Item	Definition/Explanation
20042	**Silviculture and Reforestation**	Silviculture and reforestation costs include all charges relating to meeting free to grow (or equivalent) legal obligations including the following activities: • Field assessments, regeneration, survival, and free-growing surveys. • Site preparation such as clearing and preparation of logged over areas using either mechanical, chemical or slash burning methods. • Planting of a new crop including the costs of seedlings, storage, and transportation to the site, direct labour and supervision. • Brushing and weeding, spacing and fertilization related to the respective stand tending and improvement activities. • Retreatment activities. Include post-harvesting/site preparation costs that are typically charged to silviculture operations such as debris piling, slashing, etc. The total cost included in this line should be the total company incurred expenses for silviculture and reforestation activities as per your company's/division's income statement. This cost should include the portion of stumpage and fees paid to the government that relates to silviculture and reforestation charges (if any), less any silviculture and reforestation reimbursements from the government.
20045	**Scaling**	Includes all weigh scale and log scaler period costs (including personnel costs) and current period amortization of weigh scale capital costs that relate to produced wood. Includes all sampling costs such as spreading, sorting, reloading and piece scale. Any scaling costs related to purchased wood should be included as part of the purchased wood cost on lines 20081 to 20084.
20049	**Miscellaneous Revenue**	Include all miscellaneous revenues such as timber damage, road use etc. Do not include log sales revenue in this category.
20061 to 20069	**Timber dues/stumpage/depletion**	Includes all royalties and fees to government for harvesting on government land excluding any portion of the charges which relate to reforestation costs (reforestation charges should be included on line 20042). Include all holding and protection costs (e.g. annual rental fees for land, fire protection costs etc.). In addition, includes any timber depletion charges for timber harvested on company owned lands. These costs should be for the volumes of timber identified on lines 10021, 10022 and 10029 respectively.
20081 to 20089	**Purchased Wood Cost**	This should be the delivered cost (including stumpage and scaling costs) for all purchased wood volumes identified in lines 10051 to 10059. Do not include any overhead costs as these costs are included in lines 20101 to 20129.
20101 to 20129	**Overhead (Planning and Administration)**	Include all woodlands planning and administration overhead costs for both produced and purchased wood. Include all costs related to woodlands (e.g. woodlands clerical and administration) even if they are charged to another cost centre within your organization. If the woodlands department is charged with general corporate overhead costs that are not related to the woodland's operations, please exclude these general corporate cost allocations.
20101	**Staff (permanent)**	Include all wages, salaries and benefits for permanent employees who are directly involved in woodlands planning and administration activities. For permanent employees who are only partially involved in woodlands planning and administration activities, please include only the appropriate portion of their total wages, salaries and benefits.

Line	Item	Definition/Explanation
20102	**Staff (temporary and summer)**	Include all wages, salaries and benefits for non-permanent employees (e.g. summer students etc.) who are directly involved in woodlands planning and administration activities. For non-permanent employees who are only partially involved in woodlands planning and administration activities, please include only the appropriate portion of their total wages, salaries and benefits.
20104	**Forestry Consultants**	Include all costs for consultants who are involved in woodlands planning and administration activities.
20111	**Vehicles, Quads, Snow Machines**	Include costs for owned vehicles, leased vehicles and vehicles rented from employees. The costs should be fully inclusive (insurance, fuel, maintenance etc.).
20112	**Helicopters**	Exclude helicopter costs related to reforestation activities. Reforestation helicopter costs should be included in the Silviculture and Reforestation section.
20113	**Travel**	Include meals, entertainment, airfare, hotels etc.
20114	**Training**	Include all courses – internal and external –with respect to safety, HR etc.
20115	**Environmental Initiatives**	Include items such as forest management auditing, environmental certification and related costs.
20122	**Allocation of Corporate Costs**	Include all woodlands related costs that are allocated from the corporate office. If the woodlands department is charged with general corporate overhead costs that are not related to the woodland's operations, please exclude these general corporate cost allocations
20123	**Other**	Other costs associated with the woodlands operations that have not already been included elsewhere. Include such costs as severance payments and early retirement costs.
30001 to 30015	**Loading and Hauling Statistics**	These costs should be inclusive of any fuel adjustment increases granted during the year. Winter and Summer hauling rates are differentiated by winter weights versus summer weights as opposed to season of the year.
30036	**Proportion of Road Hauling Distance**	Note the average percentage of your operations average haul distance that you are required to maintain (i.e. some companies may haul exclusively over private roads where they are required to maintain 100% of the average haul distance while other companies may haul over primarily public roads and have a much smaller average percentage of the haul distance that they are required to maintain).
30051 to 30104	**Silviculture and Reforestation Statistics**	For each line that requests costs on a dollar per hectare basis, please divide your total costs for that particular activity (e.g. disc treatment) over only the number of hectares on which that activity was performed.
30111 to 30112	**Total Reforestation Costs**	Include all activities to meet free-to-grow (or equivalent) legal obligations within basic silviculture and reforestation costs. These costs should include an accrual for retreatments or any other costs you expect to incur to meet legal obligations even if you do not accrue all of these costs in your financial statements (i.e. accounting practices vary by company). Include all costs over and above basic free-to-grow legal obligations (e.g. additional stand tending in excess of that required to meet free-to-grow) in enhanced silviculture and reforestation costs.

Line	Item	Definition/Explanation
30116	**Silviculture and Reforestation Accrual Rate**	This amount should be the rate at which your accounting department accrues expected future reforestation costs attributable to current year's harvesting activities. This rate may or may not include a provision for expected retreatments depending on the company's accounting policies.
30121 to 30124	**Reforestation Treatments**	The percentages in these four lines should represent what portion of the total area reforested in the year used that particular reforestation treatment. The total of lines 30121 to 30124 should equal 100 percent.
30161 to 30169	**Miscellaneous Revenue**	Do not include log sales revenue as part of miscellaneous revenue.
30201 to 30206	**Certification Statistics**	The amounts in the Ha to be Certified column should represent the number of hectares you intend to certify within the next 2 years (i.e. by December 31, 2004).
30181 to 30197	**Phase Cost Statistics**	Exclude any contractor profit margins when reporting phase costs.
30211	**Climate Change Information**	If the division has undertaken a baseline analysis of greenhouse gas emissions, then report the net emissions (measured in equivalent CO2) compared to the total volume produced (m3). For purposes of this benchmark, include only logging, hauling and forest management emissions in this analysis and exclude any mill emissions.
30301 to 30314	**Safety Information**	The definition of a recordable incident is as follows: 1. Occupational deaths, regardless of the time between injury and death, or the length of the illness; or 2. Nonfatal occupational illnesses; or 3. Nonfatal occupational injuries which involve one or more of the following: Loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid). **Occupational injury** is any injury such as a cut, fracture, sprain, amputation, etc., which results from a work-related event or from a single instantaneous exposure in the work environment. **Occupational illness** is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to factors associated with employment. It includes acute and chronic illnesses or disease which may be caused by inhalation, absorption, ingestion, or direct contact. The amount shown as the **recordable incident rate** should represent the number of recordable incidences per 100 full-time workers calculated as number of recordable incidences divided by total hours worked by all applicable employees and contractor personnel during the calendar year times 200,000 (200,000 represents 100 full-time equivalent workers working 40 hours per week, 50 weeks per year).

Line	Item	Definition/Explanation
30301 to 30303	**Safety Information – General Woodlands**	Line 30301 - Planning & supervision covers woodlands personnel involved in supervision of field activities and in planning and management activities. Line 30302 – Logging covers all logging contractors, sub-contractors and company crews conducting logging or logging related activities including road construction and maintenance work. Line 30303 – Silviculture/forest management covers all contractors, sub-contractors and company crews conducting silviculture and other forest management activities.
30310 to 30314	**Safety Information – Log Haul**	Line 30310 – Load & haul covers all contractors, sub-contractors and company crews conducting loading and hauling related activities. The number of vehicle rollovers refers to where vehicle tires have left the ground whether on main roads or in-block roads. Line 30312 refers to the number of vehicle incidents that cause greater than $1,000 in damage but haven't already been included in line 30311. Line 30313 refers to the number of kilometres empty and loaded on both public and private roads for logs delivered to the mill or other destinations. Line 30314 refers to the total number of tonnes hauled during the year as represented by the log haul safety information.

Appendix IV

PwC Global Forestry Benchmarking Survey – 2002 Questionnaire

Canadian Woodlands Benchmarking Questionnaire				
Company:				
Location:				
Province:				
Type of Facility/Facilities Supplied by this Woodlands Operation: (Mark with an X)				
Lumber	Plywood/Veneer			
Pulp/Paper	Particleboard			
OSB	Other			
Woodlands Statistics - Produced Wood		**2002**	**2002**	
		Softwood	**Hardwood**	
Average tree size (m3/tree)	10001			
Average tree stocking (m3/ha)	10002			
Average block size (ha)	10003			
Total number of blocks harvested	10004			
Number of logging weeks per year	10005			
Size of forest management area (ha)	10006			
Average log scale conversion (tonne/m3)	10007			
Number of hauling weeks per year	10008			
Produced Wood Statistics (m3)		**2002**	**2002**	
Volume produced		**Softwood**	**Hardwood**	
Tree length	10011			
Cut-to-length	10012			
Commercial thinning	10013			
Tree length converted to chips in the bush (m3)	10014			
Total	10019	0	0	
Volume by sort		**Softwood**	**Hardwood**	
Sawlogs	10021			
Pulp logs, chips and wafers	10022			
Total (agrees to line 10019)	10029	0	0	
Woodlands (Continued)				
Volume by source		**Softwood**	**Hardwood**	
Government lands	10031			
Private lands	10032			
Total (agrees to line 10019)	10039	0	0	
Purchased Wood Statistics (m3)		**2002**	**2002**	
Volume purchased		**Softwood**	**Hardwood**	
Tree length	10051			
Cut-to-length	10052			
Chips (convert BDMT'S to m3)	10054			
Total	10059	0	0	
Volume by sort		**Softwood**	**Hardwood**	
Sawlogs	10061			
Pulp logs, chips and wafers	10062			
Total (agrees to line 10059)	10069	0	0	
Volume by source		**Softwood**	**Hardwood**	
Government lands	10071			
Private lands and other	10073			
Total (agrees to line 10059)	10079	0	0	
Volume Available for Conversion or Sale (m3)		**Softwood**	**Hardwood**	
Total volume produced (agrees to line 10019)	10091			
Total volume purchased (agrees to line 10059)	10092			
Total volume available for conversion or sale	10099	0	0	
Operating Cost Summary ($CDN)				
Logging costs		**Softwood**	**Hardwood**	
	Tree length	**C-T-L**	**Tree Length**	**C-T-L**
Felling and bunching 20001				
Skidding 20002				
Delimbing & processing 20003				
Forest camps 20004				
Logging overhead 20005				
In block roading 20006				
In block roading - reclamation 20007				
Other 20008				
Total to roadside 20009	0		0	0
C-T-L System (Roadside, Stumpside or Both) 20001a				
Loading 20010				
Hauling 20011		Commercial		

Canadian Woodlands Benchmarking Questionnaire					
Log haul administration	20012		Thinning		
Total log cost - FOB Mill	20019	0		0	0
Tree length converted to chips in the bush - costs			**Softwood**	**Hardwood**	
Felling and bunching		20021			
Skidding		20022			
Chipping		20023			
Total to roadside		20025	0	0	
Chip hauling cost to mill		20026			
Contractor overhead		20027			
Total chip cost - FOB Mill		20029	0	0	
Indirect costs			**Softwood**	**Hardwood**	
Road costs		20041			
Silviculture & reforestation (agrees to line 30115)		20042			
Scaling		20045			
Miscellaneous revenue (agrees to line 30169)		20049			
Produced cost before stumpage and overhead			**Softwood**	**Hardwood**	
Total produced cost before stumpage & overhead		20059	0	0	
Timber dues/stumpage/depletion			**Softwood**	**Hardwood**	
Sawlogs		20061			
Pulp logs, chips and wafers		20062			
Total timber dues/stumpage/depletion		20069	0	0	
Produced cost before overhead			**Softwood**	**Hardwood**	
Total produced cost before overhead		20079	0	0	
Purchased wood cost			**Softwood**	**Hardwood**	
Tree length		20081			
Cut-to-length		20082			
Chips		20084			
Total		20089	0	0	
Produced and purchased cost before overhead			**Softwood**	**Hardwood**	
Total delivered wood cost before overhead		20099	0	0	
Overhead (Planning and Administration)			**Softwood & Hardwood**		
Staff (permanent)		20101			
Staff (temporary and summer)		20102			
Forestry consultants		20104			
Total staffing costs		20109	0		
Vehicles, quads, snow machines		20111			
Helicopters		20112			
Travel		20113			
Training		20114			
Environmental initiatives (ISO, CSA etc.)		20115			
GIS period costs		20116			
Allocation of corporate costs		20122			
Other		20123			
Total planning and administration		20129	0		
Total delivered cost			**Softwood & Hardwood**		
Total delivered wood cost		20199	0		
Operating Statistics			**Softwood**	**Hardwood**	
Loading Statistics					
Loading Cost ($/tonne)	30001				
Loading Hourly Rate ($/hrs)	30002				
		Softwood & Hardwood			
Hauling Statistics ($/tonne)		**Tree Length**		**C-T-L**	
Hauling Cost ($/tonne - km)	30011				
Hauling Cost ($/tonne-hour)	30012				
Hauling Hourly Rate - Winter ($/hrs)	30013				
Hauling Hourly Rate - Summer ($/hrs)	30014				
Hauling Bonuses/Incentive payments	30015				
Hauling average pay load (tonnes)	30016				
Hauling average distance (one way-km)	30017				
Hauling average cycle time (minutes)	30018				
Road Building Statistics			**All Wood**		
Cost of main roads, all weather, gravel ($/km)		30021			
Cost of secondary roads, all weather, gravel ($/km)		30022			
Cost of secondary roads, winter only ($/km)		30023			
Cost of temporary/seasonal/interior spurs ($/km)		30024			
Main roads built, all weather, gravel (km)		30025			
Secondary roads built, all weather, gravel (km)		30026			
Secondary roads built, winter only seasonal (km)		30027			

Canadian Woodlands Benchmarking Questionnaire				
Temporary/seasonal/interior spurs built (km)	30028			
Road Maintenance Statistics		**All Wood**	**All Wood**	
		$/km	**$/m3**	
Cost of summer grading maintenance	30031			
Cost of summer dust control	30032			
Cost of winter grading/snow control	30033			
Cost of sanding/ice control	30034			
Cost of gravelling	30035			
Proportion of road hauling distance that required	30036			
to maintain (%)				
Woodlands (Continued)				
Silviculture and Reforestation Statistics		**2002**		
Site Preparation		**Softwood**		
Disc treatment ($/ha)	30051			
Drag treatment ($/ha)	30052			
Ripper treatment ($/ha)	30053			
Herbicide treatment ($/ha)	30054			
Winter mounding ($/ha)	30055			
Summer mounding ($/ha)	30056			
Mini mounding ($/ha)	30057			
Pile burning ($/ha)	30058			
Other site preparation costs for basic	30059			
reforestation ($/ha)				
Total site preparation costs for basic	30060			
reforestation ($/ha)				
Planting		**Softwood**		
Seedling/seed cost ($/ha)	30061			
Planting prepared sites ($/ha)	30062			
Planting unprepared sites ($/ha)	30063			
Aerial seeding ($/ha)	30064			
Total planting costs for basic reforestation ($/ha)	30065			
Average number of seedlings planted per hectare	30067			
Hectares planted	30068			
Plantation maintenance		**Softwood**		
Regeneration surveys - first and second ($/ha)	30071			
Other optional surveys ($/ha)	30072			
Manual weeding ($/ha)	30073			
Chemical weeding ($/ha)	30074			
Regeneration surveys - first and second	30075			
(ha surveyed)				
Other optional surveys (ha surveyed)	30076			
Manual weeding (ha weeded)	30078			
Chemical weeding (ha weeded)	30079			
Nursery		**Softwood**		
Cost of growing seedlings ($/tree)	30081			
Cost of shipping seedlings ($/tree)	30082			
Cone collection costs ($/kg)	30085			
Enhanced reforestation		**Softwood**		
Tree improvement ($/ha)	30101			
Stand tending ($/ha)	30102			
Density management ($/ha)	30103			
Other enhanced reforestation ($/ha)	30104			
Total reforestation costs		**Softwood**	**Hardwood**	
Basic silviculture and reforestation cost ($)	30111			
Enhanced silviculture and reforestation cost ($)	30112			
Silviculture and reforestation cost	30115	0	0	
($ - agrees to line 20042)				
Silviculture and reforestation accrual rate ($/m3)	30118			
Reforestation treatments				
Planting (% of total area reforested)	30121			
Seeding (% of total area reforested)	30122			
Leave for natural (% of total area reforested)	30123			
Other (% of total area reforested)	30124			
Site preparation				
Planting (% of area planted that was site prepared)	30126			
Seeding (% of area seeded that was site prepared)	30127			
Leave for natural (% of naturals area site prepared)	30128			
Other (% of other reforested areas site prepared)	30129			

Canadian Woodlands Benchmarking Questionnaire				
Purchased Chip Statistics		**Softwood**	**Hardwood**	
On-truck chip cost for purchased chips ($/BDMT)	30131			
Overhead (Planning and Administration) Statistics		**Softwood**	**Hardwood**	
Staff				
Staff (FTEs)	30141			
Consultants (FTEs)	30142			
Total staff and consultants (FTEs)	30149	0	0	
Miscellaneous Revenue Statistics		**2002**	**2002**	
Revenue sources		**Softwood**	**Hardwood**	
Timber damage etc. ($)	30161			
Road use ($)	30162			
Other ($)	30163			
Total misc. revenue ($-agrees to line 20049)	30169	0	0	
Certification Statistics		**Ha Certified**	**Ha to be Certified**	
CSA - SFM	30201			
ISO 14001	30202			
Forest Stewardship Council	30203			
AF&PA Sustainable Forestry Initiative	30204			
AFPA Forest Care	30205			
Other (please identify): _____	30206			
Phase Costs Statistics	**Feller Buncher**	**Grapple Skidder**	**Rail Delimber**	**Chip per**
Annual volume per machine (m3/year) 30181				
Machine productivity per hour				
(m3/productive machine hours) 30182				
Fuel cost ($/m3) 30185				
Lubrication cost ($/m3) 30186				
Chain & knife costs - chipper only ($/m3) 30187				
Machine depreciation expense ($/m3) 30188				
Interest expense ($/m3) 30189				
Insurance and licensing expense ($/m3) 30190				
Maintenance and repair expense ($/m3) 30191				
Total machine cost ($/m3) 30192	0	0	0	
Labour & benefits ($/m3) 30193				
Total phase costs ($/m3) 30194	0	0	0	
	Processor		**Forwarder**	
Annual allocated volume (m3/year) 30196				
Hourly rate ($/hour) 30197				
Woodlands (Continued)				
Other Woodlands Statistics				
Climate Change Information				
Greenhouse gas emissions intensity (m3/metric				
tonne of CO2e)	30211			
Safety Information - General Woodlands		**2002**		
Planning & supervision recordable incident rate	30301			
Logging recordable incident rate	30302			
Silviculture/forest management recordable	30303			
incident rate				
Safety Information - Log Haul		**2002**		
Load & haul recordable incident rate	30310			
Number of vehicle rollovers	30311			
Other vehicle incidents > $1,000	30312			
Total km for log haul	30313			
Total tonnes hauled	30314			
Other				
Briefly describe and explain any major fluctuations between 2002 and the previous year costs and/or statistics:				

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Endnotes and References

[1] The Social Responsibility of Business is to Increase its Profits, *Milton Friedman, The New York Times Magazine*, September 13, 1970. The New York Times Company.

[2] Competitive Strategy: Techniques for Analyzing Industries and Competitors, *Michael Porter,* The Free Press, 1980

[3] Firm Resources and Sustained Competitive Advantage, *Barney, Jay, Journal of Management,* 1991, Vol. 17, p.100

[4] Ibid: 100

[5] Ibid: 102

[6] Ibid 106-112

[7] Sustainable Competitive Advantage: What It Is, What It Isn't. *Coyne, Kevin P. Business Horizons.* 1986. Vol. 29 (January-February): 54-61.

[8] Global Reporting Initiative – 2002 Guidelines: http://www.globalreporting.org/guidelines/2002.asp

[9] Stratos Report – *Building Confidence: Sustainability Reporting in Canada,* http://www.stratos-sts.com/pages/publica.htm

[10] *Webster's Revised Unabridged Dictionary, © 1996, 1998 MICRA, Inc.*

[11] United Nations World Commission On Environment and Development (The Brundtland Commission), Our Common Future, 1987

[12] The World Bank, World Development Report 1992: Report on Development and the Environment: 13

[13] Ibid: 53