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# Examining the Impact of Corporate Commitment to Sustainability

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# Examining the Impact of Corporate Commitment to Sustainability

**by**

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# Dedication

In loving memory of my late father, Dr. Mamoun Beheiry (1925-2002).

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# Examining the Impact of Corporate Commitment to Sustainability

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This dissertation presents the culmination of a research study, started at the University of Texas at Austin in August 2003. The main objective of the study was to establish a research mechanism to investigate the impact of corporate commitment to all three pillars of sustainability on capital project planning and capital project performance. The research hypothesis was that a higher balanced commitment to the three pillars of sustainability leads to better capital project planning and ultimately to better cost and schedule performance in large industrial and building projects, by mitigating the risks in project execution. To achieve the objectives of this study, sustainability indicators were condensed into two empirical indices. The first index measured Corporate Commitment to the three pillars of sustainability. It is referred to as the Corporate Sustainability Commitment Index (CSCI). The second index measured the degree of integration

of sustainable practices in capital project planning. It is referred to as the Sustainability Component of Project Planning Index (SCPPI).

The research study then focused on the two most important project performance measures, cost and schedule predictability. Project success is typically referred to as meeting business objectives, on time, and within budget. Therefore, 38 Fortune 100 multinationals were contacted and data on CSCI, SCPPI and project performance was collected from 20 of these organizations. Seventeen of the 20 organizations were owners and three were top contractors. Owner data was focused on and analyzed to examine the nature of the relationship between sustainable practices and project performance, while contractor data added perspective and helped establish the nucleus for further research comparing the sustainability practices of both owner and contractor companies.

The study concludes that the survey instrument and research premise are useful foundations for further examination of the relationship between owner commitment to sustainability and capital project performance. The data collection and analysis, albeit very statistically constrained by the sample size, lay the groundwork for further research. More data collections should lead to more statistically significant relationships and conclusive trends. Finally, this dissertation provides several recommendations to aid in the implementation of the study findings and the learning experience from industry input.

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# Chapter 1: Introduction

## 1.1 Introduction to the Research Premise

Although the concept of Sustainable Development (SD) or sustainability continues to gain favor worldwide, public opinion still harbors prevalent skepticism about its business value. Considerable research has been and continues to be carried out to counterbalance this notion, but greater focus is generally placed on the environmental pillar of sustainability. While the environmental dimension of SD is inherently crucial, more emphasis needs to be placed on the other two sustainability pillars, social and economic development. The impact of the social and the economic development aspects of sustainability have attracted more multinational business attention lately and need to be integrated with the concept of environmental prudence before any business value analysis can be performed. Understanding this interface between the three pillars is essential to studying any causal relationship with the financial bottom line.

Furthermore, the historical tendency to focus on environmental sustainability overaligned SD with the green movement and alienated the business cadre. With the decision making core in most multinational businesses averse to the slogans of SD, its proponents found themselves branded as more idealistic than pragmatic. Consequently, multinationals were reluctant to fully embrace the underlying notions of SD. This reluctance was damaging to the concept of sustainability because multinationals, with their international presence, tend to be the entities most capable of promoting its principals. The overalignment of SD with the green agenda also prompted a natural gravitation in research towards relating the business case for sustainability with the

technological savings in the life-cycle costs of the built assets. Little research existed about the impact of sustainable practices on the initial investment in capital assets.

Hence, this research was formulated to establish a premise upon which the impact of corporate commitment to sustainability on capital project performance can be examined. The research hypothesis was that a higher balanced commitment to the three pillars of sustainability leads to better capital project planning and ultimately to better cost and schedule performance in large industrial and building projects, by mitigating the risks in project execution. Risk mitigation, by better sustainability awareness and commitment, is more likely to work if the commitment to sustainability at the top of the organization filters down to the project planning level.

Sustainable development is classically portrayed as the interface between environmental, economic, and social sustainability (Goodland and Daly 1996) and the idea is regularly presented in a diagram of three interlocking circles, with sustainable development representing the point of overlap. The popularity of this illustration stems from its close depiction of the circular or continuous interface between the three pillars. Please refer Figure 1.1.

Economic development is ethical, wholesome economic growth. Social development is corporate commitment to the betterment of humanity via promoting responsible care in its relevant operating environments. It is typically referred to as Corporate Social Responsibility or CSR and is defined as the responsibility multinationals hold to behave fairly in their host countries and to reduce the effects of industrial development on the local communities they encounter.

Moreover, environmental prudence is accepting our obligation to future generations to reduce our ecological footprint on planet earth. Irresponsible over

development can deprive future generations from their rights to a livable habitat. It is essential for any accurate measurement of sustainability commitment to address the three pillars, and it was therefore very important to develop the research methodology based on the main issues underlying all three.

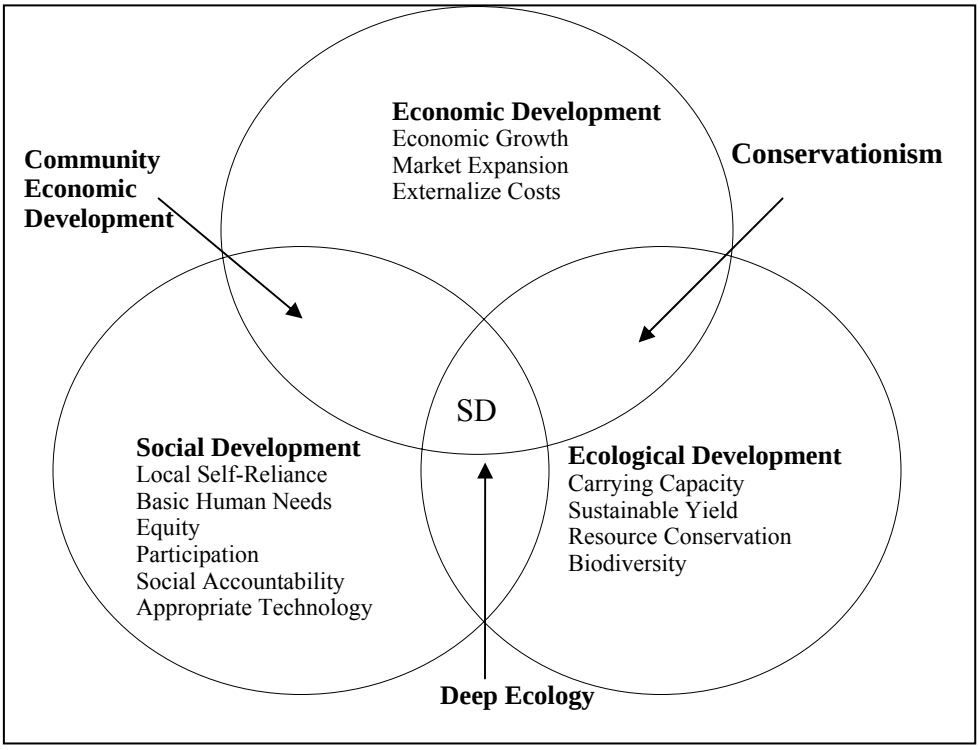



Figure 1.1: The Three Pillars of Sustainability

## 1.2 RESEARCH OBJECTIVES, HYPOTHESIS AND SCOPE

### 1.2.1 Research Objectives

The main objective of this research was to establish a premise upon which we can study the impact of owner Corporate Commitment to Sustainability on capital

project planning and performance. The research methodology involved the creation of five sub objectives to support the main objective. These five sub-objectives were:

- Develop a Corporate Sustainability Commitment Index (CSCI) that enfolds the three pillars of sustainability (economic, social, and environmental), with clear emphasis on issues of social justice, and implement a survey to measure CSCI and validate survey using expert opinions.
- Develop a Sustainability Component of Project Planning Index (SCPPI), and implement a survey to measure SCPPI and validate survey using expert opinions
- Examine the relationship between CSCI and project performance
- Examine the relationship between CSCI and SCPPI
- Examine the relationship between SCPPI and project performance

### 1.2.2 Research Hypothesis

It is hypothesized here that a higher balanced commitment to the three pillars of sustainability leads to better capital project planning and ultimately to better cost and schedule performance in large industrial and building projects, by mitigating the risks in project execution. Corporations that are more aware of and more committed to sustainability (ethical financial practices, social responsibility, and environmental prudence) should have relatively better capital project performance in terms of meeting their cost and schedule estimates. This is especially the case when this commitment is reflected on the level of planning for sustainability related risks in capital projects. Sustainable project practices address capital projects risk factors, such as stakeholders' buy in, local community acceptance, safe operations, and labor satisfaction. If not

addressed properly during project planning and definition, these risk factors can negatively influence project performance by delaying projects and consuming contingency on unforeseen obstacles. They can also disturb site operations with high occurrences of injury incidents and reduce labor satisfaction, hence increasing the rate of turnover and affecting productivity

### 1.2.3 Research Scope

This research was restricted to fortune 100 owner corporations with substantial international operations. These companies are more likely to have sizable sustainability or SD units at headquarters. They also tend to execute more large international projects that are located in underprivileged communities and are hence more capable of providing data that is relevant to this research. Sustainable practices tend to have a larger effect at reducing risk in larger Greenfield projects. Smaller revamp and modernization projects do not typically involve developing new sites and interacting with new local communities and hence do not fall under the same SD rules as large Greenfield projects. Therefore, to obtain valid survey responses and to keep the data analysis consistent, the projects chosen were restricted to large or mega industrial projects. The project performance measures were also restricted to the more crucial elements, cost and schedule deviation. Some contractor organizations were also contacted, but only a few responded, rendering any comparison between owners and contractor practices unviable.

## 1.3 RESEARCH METHODOLOGY

To achieve the objective of this study, first, a survey tool had to be created and its format validated. Secondly, data had to be collected on the final survey version to measure corporate sustainability commitment and the degree of integration of

sustainability practices in capital project planning. The survey also had to be used to collect data on capital project performance. Thirdly, the data collected had to be examined to verify the validity of using this research mechanism in measuring the impact of sustainability commitment on project performance. Figure 1.2 illustrates the research methodology.

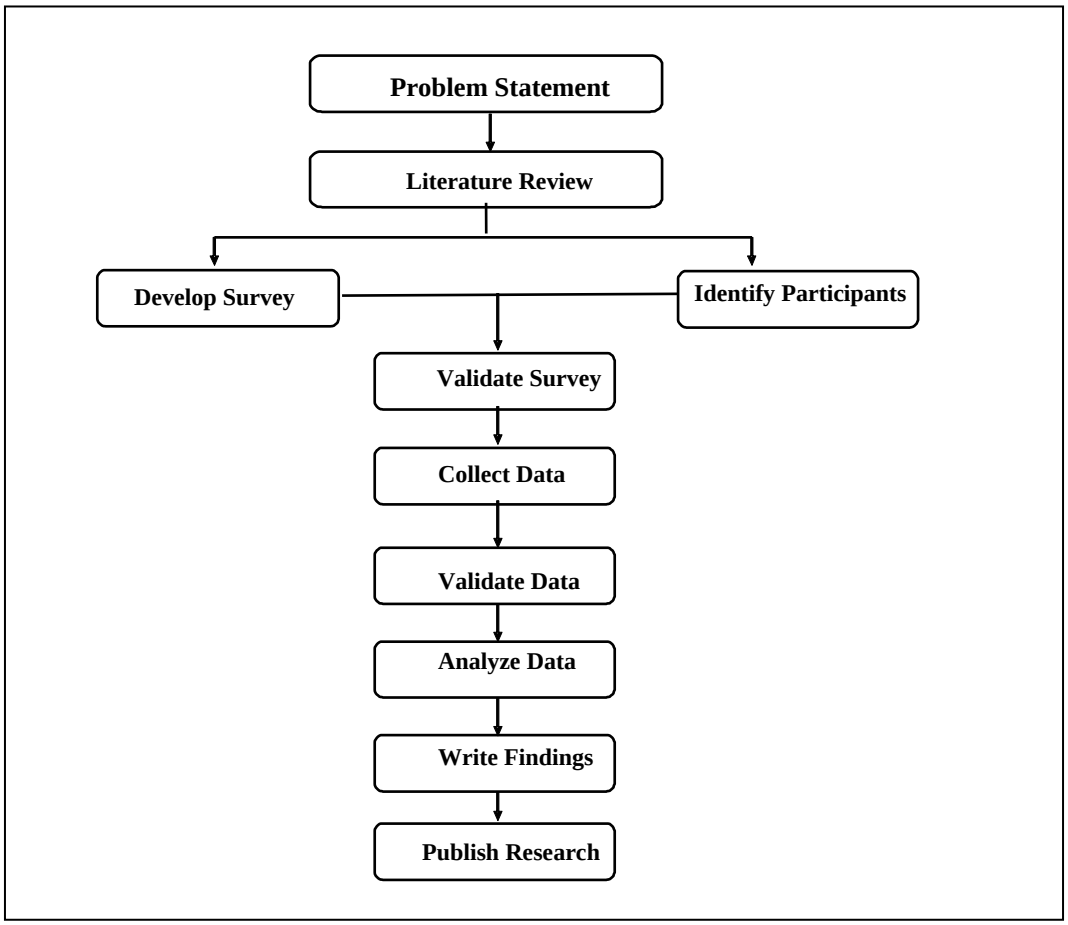



**Figure 1.2: Research Methodology**

The survey tool was designed in three sections, the Corporate Sustainability Commitment Index (CSCI) section, the Sustainability Component of Project Planning

Index (SCPPI) section, and the Capital Project Performance section. The CSCI was developed by condensing the sustainability indicators for the three pillars of SD into a Likert Scale survey format. SCPPI was also designed on a Likert Scale for uniformity and user friendliness. SCPPI measured the degree to which commitment to the sustainability indicators at the top of Multinational Corporations was filtering down to best practices at the project planning level.

A set of 38 companies was identified as suitable participants in the study. Several sustainability experts from these companies were contacted to obtain feedback on the survey format and contents. Moreover, a workshop was held at the Construction Industry Institute (CII) annual conference in Vancouver in July 2004. During that meeting, 10 senior industry representatives shared insight regarding the survey format and the research direction.

After validating the format of the survey, its final version was issued. It was mailed to all 38 companies. Several companies agreed to participate vial electronic mail or teleconferencing and a number of teleconferences were held to collect data from these companies. The responses were then validated by referring to the applicable corporate performance annual reports, sustainable development annual reports, and online sustainability publications. The participants were also directly contacted for clarification when discrepancies were detected in the survey responses.

Subsequently, Results from the corrected responses to the survey were computed to create a 1(low) to 10(high) CSCI index score for each corporation. The respondents were then asked to volunteer one or more projects to complete the SCPPI Likert Scale portion of the survey and the project performance section. Similar to CSCI, the responses for SCPPI were calculated to create a 1-10 Index score for each company.

The data was then examined via fundamental statistical methods to assess the validity of using this research mechanism as a basis for establishing the relationships among the two indices and project performance.

Furthermore, the indices and research results were shared with a group of academics and industry professionals at the National Science Foundation's (NSF) Construction and the Environment - Research Foci for a Sustainable Future Workshop. This workshop was held at the University of South Carolina in Columbia, South Carolina, earlier this year. The response to the research was very positive. Furthermore, the group recognized the urgent need for sustainability metrics and benchmarking as a foundation for sustainability research in the United States and stated this need as one of the workshop's top recommendations to the NSF for future research funding.

### 1.4 DISSERTATION ORGANIZATION

This dissertation has six chapters. Each chapter is structured to answer or help answer one of the following five questions.

- Chapter 1: Introduction
  - Answers the question *"**What** research questions were we seeking to answer?"*
- Chapters 2 and 3: Research background and the Business Case for Sustainability
  - Answer the question *"**Why** did we seek to answer these questions?"*
- Chapter 4: Research Methodology
  - Answers the question *"**How** did we approach answering these questions?"*
- Chapter 5: Data Analysis

  - Answers the question *"**What** were the research findings?"*

- Chapter 6: Conclusions and Recommendations
  - Answers the question *"**What** is the path foreword?"*

# Chapter 2: Research background

This research could not be complete without a thorough review of the accepted definitions of sustainability, and the theoretical economic background behind this concept. To fully appreciate the purpose of this research, it is important to first understand the historical development of the term "sustainability", the evolution of its definition encompassing the three pillars (economic, social and environmental), and the different ideological positions behind the pro and anti debates. Furthermore, it is important to be acquainted with the public's expectations of Multinational Corporations' behavior regarding sustainability and the relationship between the notion of the ethical investor and the bottom line profitability of business operations. It is, therefore, imperative in this research to establish a definition of sustainability, upon which the research framework can then be built.

## 2.1 WHAT IS SUSTAINABILITY?

"*Why has the idea of sustainability become so important in recent years? One reason is that it is much more powerful rhetorically than an idea like being "environmentally friendly". Not caring about the environment has a long history and is still regarded as acceptable in some circles, but publicly saying that you don't care that what you are doing is unsustainable sounds tantamount to admitting that you are intellectually incoherent*". (Dresner 2002)

The concept of sustainability as it is known today was first used by the World Council of Churches in 1974. It was proposed by western environmentalists in response to the developing world's objections to worrying about the environment at a time when human beings in many parts of the world suffer from poverty and famine. The concept

of sustainable development was introduced by the International Union for Conservation of Nature and Natural Resources in 1980.

The World Council of Churches (WCC) coined the term "*sustainable society"* at an ecumenical study conference on Science and Technology for Human Development. *"First social stability can not be obtained without an equitable distribution of what is in scarce supply or without common opportunity to participate in social decisions. Secondly, a robust global society will not be sustainable unless the need for food is at any time well below the global capacity to supply it and unless the emission of pollutants are well below the capacity of the ecosystem to absorb them. Third, the new social organization will be sustainable only as long as the use of non-renewable resources does not outrun the increase in resources made available through technological innovation. Finally, the sustainable society requires a level of human activities which is not adversely influenced by the never ending large and frequent variations in global climate*" (WCC Report, Geneva 1974). The sustainable society concept was revolutionary because it started with the principal of equitable distribution, followed by the prudent use of natural resources. This laid the ground for the renowned Brundtland Report years later.

The concept of sustainability as a social and environmental idea would not gain prominence until the United Nation's World Commission on Environment and Development published the Brundtland Report in 1987. The report was entitled Our Common Future. It continues to be generally referred to as the Brundtland report, after Norwegian Prime Minister G.H. Brundtland, who chaired the commission. The central message of the report was that the only way to balance the eternal trade off between

economic development and environmental protection was through a new approach, namely sustainable development.

The Brundtland report defined sustainable development as development that meets the needs of the present without comprising the ability of future generations to meet their needs. The report went further to attest that the central concept in sustainable development was equity, both between generations and within generations. Albeit vague, this definition struck the right chord with many governments and international agencies in both the developed and developing world. Hence, the term sustainable development quickly became a popular umbrella under which many issues were placed.

Building on the Brundtland Report, the 1992 Rio Erath Summit concluded its sessions with the following definition for sustainability *"Sustainable Development is development based on patterns of production and consumption that can be pursued into the future without degrading the human or natural environment. It involves the equitable sharing of the benefits of economic activity across all sections of society, to enhance the well-being of humans, protect health, and alleviate poverty."*

Many authors argue that the Brundtland definition of sustainable development was simple but rather vague. This, in addition to the support for the concept by economists and politicians of that era, prompted distrust among many environmentalists. There were fears that sustainable development was an oxymoron. Some proponents used the concept to emphasize the possibility of continued development without hurting the environment, while others used it with more weight placed on the environmental sustainability dimension. Moreover, straight out opponents claimed it was a meaningless concept, likely to be used as a cover to continue inequitable development and the destruction of natural resources. *"The original idea of*

*development was based on a progression from traditional to modern mass-consumption society. Within this framework, a tension has developed between the promotion of economic growth and the equitable provision of basic needs. Development as it has proceeded over the last half-century has remained inequitable*." (Harris and Goodwin 2001).

Thus, sustainability remains a controversial concept almost two decades after the Brundtland report. *"Sustainable development is a term that everyone likes, but nobody is sure what it means"* (Daly 1996, Page 1). However, many advocates see the lack of agreement on its meaning as a positive rather than negative aspect. Simon Dresner in his 2002 book "*The Principals of Sustainability*" argues that sustainable development is a contestable concept like "liberty" or "justice"; most people support these goals but disagree about what exactly constitutes liberty or justice.

### 2.2 SUSTAINABILITY AND EQUITY

The Brundtland report is credited with extending the idea of equity in sustainable development to a moral obligation within generations as well as between generations. It was a natural extension of the notion and provided a middle ground for the opposing arguments between environmentalists, socialists, and developing countries. Environmentalists were often criticized by developing countries because of their "Malthusian" view of the world. Their argument for environmental protectionism was seen as rooted in Malthus' 18$^{th}$ century argument that uncontrolled population growth among the poor was sending the world to its doom, by eating up surplus resources. Developing countries viewed these calls for limits on growth as a cover for traditional conservative arguments that wealth was too scarce for everyone to share in it. Hence, environmentalists were accused of voicing justifications for inequality.

By combining the idea of moral obligation between generations and within generations, the Brundtland report sought political reconciliation between Malthus and Marx. Marx's idea of socialism revolved around the poor having the same common sense that stopped the rich from breading themselves into poverty. Marx argument against Malthus espoused the potential for scientific and technical progress as a means for combating a population bomb. Interestingly enough, free market economists often join in Marx's faith in sustainable growth via technological progress.

Ultimately, the Brundtland report enabled the support of free market economists, environmentalist, and developing countries for the concept of sustainable development, by introducing a conciliatory middle ground. Drawing on renowned 1970's work by economist E.F. Schumacher, who linked the economy with social justice and concerns about pollution and natural depletion of resources, the Brundtland commission stressed the importance of the integration of environmental decisions into central economic decision making. The report gave the example of the ministries or departments of energy and industry promoting production goals and the departments of the environment handling the resultant pollution. The consequence was environmental costs being ignored in economic planning, and society later paying the price.

Post Brundtland, environmental economists started defining sustainability in terms of non-depletion of capital. Capital was defined as not just finance but also land and labor. Environmentalists, on the other hand, started promoting sustainability as requiring industrialized countries to reduce their consumption of resources per capita to a level where everyone in the world could enjoy a reasonable standard of living for generations to come. Soothed by the compromise that placed fighting poverty on par with environmental concerns, developing countries embraced the concept and started to

demonstrate more inclination to accept some environmental responsibility. Their protests do continue though, framed in the argument that their current usage of earth resources is minuscule compared to the developed world.

### 2.3 ECONOMIC GROWTH VERSUS SUSTAINABLE ECONOMIC DEVELOPMENT

In 1967, Edward Mishan rattled the economics profession by publishing "The Cost of Economic Growth". In it, he argued that conventional calculations of GNP were seriously misleading as a measure of human welfare because they included the costs of defensive measures such as anti-pollution expenditure and ignored the negative effects on growth of affluence like aircraft noise. Mishan's arguments were solid and triggered the emergence of the currently respected branch of environmental economics (Dressner 2002, Page 23).

When designing and promoting local economic development programs, practitioners encounter three enduring questions. The first question is *whether the expansion of opportunities in the market economy is seen as a "good" thing in all communities*. Pure expansion of economic opportunity is often viewed by moralists or environmentalists as an "unholy" or unethical pursuit. If the plans to expand economic opportunity in a community undermine the cultural, ethical, or religious fabric of the community, the community in question might opt against such expansion.

The arguments for and against expanding economic opportunity in a market economy stem from the difference in definition between economic growth and economic development. Kindleberger and Herrick define economic growth as more output while economic development implies both more output and changes in the technical and institutional arrangements by which it is produced. Economic growth typically refers to the increase in a country's or a region's output of goods and services.

It is usually measured by changes in real GDP. Development, on the other hand, is the process of improving the quality of life of all people within a country, or region. Here in lies the problem; "quality" of life is in the eye of the beholder.

Hence, any economic development program, however well intentioned, may not lead to the desired results if the planners do not take into account the characteristics of the local and regional economy and the long-term effects of their policies. A well thought-out program should first consider whether a market expansion strategy is worth its ecological, environmental, and cultural costs to the local economy. Moreover, any possible benefits should be considered. If the decision is made to pursue a formal market economy expansion strategy, then according to the SD philosophy, the strategy should aim to improve distribution of income and equalize opportunity, not just increase the number of jobs in the economy.

Eisinger (1988) argued that increasing the number of jobs in an economy does not necessarily correlate with better standards of living. He cited the booster campaigns adopted by the southern states seeking industrialization between 1935 and 1960. Eisinger quoted Cobb (1982) that the booster campaigns were built on the appeal of an abundance of docile workers willing to work for wages well below the national average. Many of the southern states that sought out and attracted low wage industries, experienced lower than the national average personal income growth. It was apparent that in this case increasing the quantity of available work was done with no forethought about the quality of employment offered and the long-term drain on public resources that the large number of low-income employees would impose on these economies, given that the state typically picks up the lower income families tap for health insurance

and basic education. “Emphasis on employment growth alone is a form of naive boosterism in which more is equated with better” (Conroy 1975)

The example of the southern states presented in Eisinger’s argument is further illustrated by the second question that economic development practitioners encounter “*what kind of economic development is desirable?*” In addition to the importance of job quality versus job quantity discussed above, the choice of economic development strategy should also consider aspects such as creating the jobs for the residents within the community. The job creation effort will be useless if the jobs are simply taken over by competition from higher skilled outside labor that chooses to commute into the area and then commute out at the end of the workday to pay income and property taxes in a different region. Washington D.C. is a prime example of this phenomenon.

On the other hand, there were positive examples of prudent economic development. For instance, Indiana pursued an economic goal that focused on the quality of jobs and the development of more rewarding, prosperous employment and business opportunities (Eisinger 1988). The economic development strategy should also take into account any negative side effects of the jobs created, such as environmental degradation, overall ecological sustainability, and health and safety aspects of labor on the job and of the neighborhoods, in which these industries are placed.

The third and seemingly “eternal” economic development question is *what is the appropriate role of the public sector in economic development?* There is a wide spectrum of opinions on this topic ranging from advocating considerable government involvement in economic development policy to advocating government detachment from all economic development policy allowing the free adjustment of the market. The three main views are: (1) government involvement, (2) government support of policies

to correct only market failure, and (3) government detachment. The arguments seem to stem from beliefs that range from one extreme to the other. Some have a strong conviction that government agencies should have a leading role in setting sound economic development strategies. Others believe that governments lack the competency to reverse market failure. The market should be left to correct itself. Those opting for the middle ground, acknowledge that governments can successfully intervene to correct certain market failures. This question may be too complex to be answered without taking into account the unique characteristics of local and regional economies.

Eisinger argued for less government involvement by showing more statistical evidence in favor of the private investment model. The private investment model supported the notion that private investment was accompanied by positive social effects such as lower unemployment, reduction of families under the poverty line and an increase in per capita income growth. The public investment model did not show the direct link to positive social outcomes; the effect was assumed to be diluted if not lost following the primary outcomes of the public model of growth in per capita property tax and local revenues. The public benefit model was based on government intervention leading to higher private investment, leading to increased taxable capital stock and more jobs and more income, leading to a larger tax base, increasing tax revenues while reducing tax rates, which then leads to better public services in the shape of incentives for more firms to relocate into the area, and the virtuous circle continues.

Nevertheless, Eisinger found little support that economic growth reduces property tax rates and that property tax rates per capita were unrelated or even slightly inversely related to employment shifts. Eisinger concluded from these findings that economic gain via the public sector investment model might enhance the local treasury

but that it did not necessarily translate to property tax relief. The additional revenues might be either squandered or absorbed by the services provided to the new industries or firms lured to move into the region.

Moreover, Eisinger's empirical research did show slightly higher correlation coefficients for the private sector model. He also quoted considerable research that shows strong relationships between employment growth and positive measures of economic wellbeing. "While the debate about the usefulness of policy intervention in inducing investment remains inconclusive, it is apparent from these two models that the paths to wellbeing lies exclusively through the private sector" (Eisinger 1988)

Despite the empirical findings presented by Eisinger, it may be prudent to remain skeptical of any hard conclusions concerning investment models. It appears that, numbers aside, the choice to advocate either model tends to stem from some inherent trust or lack of trust in the government's competency, ability, or goodwill in transferring revenues into appropriate government expenditure that will reduce unemployment and improve individual quality of life. The pro and for arguments appear to come less from data and more from general ideological beliefs. Eisinger quotes a North Carolina politician saying that governments should empower private businesses to "do what they do best, creating and preserving jobs".

Consequently, economic development practitioners or enthusiasts may study their proposed programs against the results presented by Eisinger to decide on the likelihood of their strategies lowering unemployment and inducing growth and development in a local economy. After deciding on a program, the practitioner may decide what role he/she would desire for the public or the private sector to play in promoting that strategy.

Bartik (1990) supported Eisinger's research but went further to advocate the use of a cost benefit analysis to be undertaken before deciding on the level of incentives firms or industries are given to relocate into a region. The cost benefit analysis put forward by Bartik can be a useful method to decide on the "goodness" of introducing an economic development strategy in any area and the desirability of one type of economic strategy versus the other. Bartik's work also provides a sound ground for deciding on the feasibility of government incentives or barriers for a firm to relocate against the value for the community from the relocation of this firm.

Most importantly for this study, however, is the link between economic development and sustainable economic development. Herman Daly, in his books Ecological Economics and Beyond Growth, maintains that the public and private benefit models ignore the issue of sustainable development. The two models presume that we can keep inducing endless local, regional, or global economic growth, without depleting our natural resources. They fail to recognize the limitations of our world, which is characterized by finite resources.

Sustainable development as strongly argued by Daly means a radical shift from a growth economy to a steady state economy. Daly argues that growth is the increase in the physical state of matter/energy throughput that sustains the economic activities of production and consumption of commodities. A staunch believer in the fragility of our ecological system, Daly argues that throughput starts with pollution and ends with depletion. Daly's proposed steady state economy (SSE), on the other hand, suggests a constant aggregate throughput, though its allocation among competing uses is free to vary in response to the market. An SSE is not static. It can develop and transform but

not grow. As Daly eloquently puts it: "*like the planet earth, of which the SSE is a subsystem, can develop without growing*".

A less environmentally intense, but still precautionary work was presented by Robert Costanza in 2001. Costanza reviews the gamut of subjective views the world holds regarding the delicacy of our environmental system, from an "unlimited resources/technological optimism" to a "limited resources/technological skepticism" extreme. He argues that the subjective view we hold of our current state of the earth and of our likely future strongly shapes the policies we make today. Costanza advocates a cooperative, precautionary policy that assumes limited resources is the most rational and resilient course in the face of fundamental uncertainty about the limits and capabilities of technology.

Although sustainable behavior is easier said than done, one would tend to agree with Daly's and Costanza's precautionary view. Sustainable development may not be painless, but the world has to try before conceding.

### 2.4 SUSTAINABLE DEVELOPMENT AND ECONOMIC MARKET FAILURE

"*Market failure is the failure of private markets to achieve economic efficiency, a situation in which no change would result in net dollar benefits, summed over all members of society……..It is caused by impediments to operating markets."* (Bartik, 1990) A market failure approach to economic development directs regional economic development policies with the aim of correcting market failures to achieve efficiency. It should prompt the utilization of benefits not adequately valued by free markets, if the value for society of these benefits exceeds their costs. Batrik advocates public sector intervention if there is clear evidence of market failure.

Four common types of market failure that Bartik discusses are unemployment, underemployment, human capital, and research and innovation spillovers. Unemployment is a market failure when it is involuntary, i.e. when individuals without employment are willing to work at the prevailing wage for jobs for which they are qualified. Bartik relies on the efficiency wage theory to explain involuntary unemployment. Firms willingly raise wages above the lowest wage at which qualified unemployed persons could be hired because higher wages lower company costs, via lower turnover, higher satisfaction and lower benefits and overhead costs. Reducing involuntary unemployment is a possible goal for economic development policy. If the unemployment benefit which is the difference between the lowest wage for which the involuntary unemployed person would accept a job and the actual wage he receives is less than the cost of the regional development policy, then the development policy would pass the cost/benefit test.

Underemployment is defined by workers wanting better paying jobs, for which they are qualified, in other firms or industries. Differences in wages between industries cannot be generally explained by worker skill, maybe more by supply and demand mechanisms for the commodity sold by an industry. Provided the workers are actually qualified to move into the jobs in better paying industries, an economic development policy can achieve non-market outcomes by shifting a regional economy into higher wage industries. The extra wage premium of current residents can be used to evaluate or measure the upgrading benefits from regional economic development policies. In other words, if new jobs from a regional development program, including the jobs from multiplier effects have higher industrial wage premiums than what is prevailing in the

region, the extra wage premium for current residents should be counted as an upgrading benefit.

A market failure also results from lack of investment or underinvestment in human capital. Human capital investment takes the shape of training and education. There are several obstacles to investment in human capital, including lack of access to relevant training and lack of financing because lenders cannot repossess human capital. Moreover, it is difficult to measure human capital before acquisition. Fear of "brain drains" can be another reason for underinvestment in human capital. Education and skills training tend to be an area that has heavy public sector involvement. The earning gains of educational and training modules can be measured but social benefits like the training multiplier by the filtration of knowledge due to teamwork, social stability, and cultural fabric enhancement are harder to measure.

Underinvestment in R&D is a result of many firms targeting short-term profit as opposed to long-term benefits. Moreover, products developed by certain firms or industries might not prove truly beneficial and cost effective until they spillover to other industries. Electronics are a prime example. R&D investment is typically a long-term venture unless the firm in question cannot survive in its industry without constant R&D, such as the innovative pharmaceutical or biotech industries. Bartik argues that public sector subsidies in R&D are justified by long term spillover effects into the whole economy and the social and national benefits from claiming breakthroughs in R&D. Measuring direct government subsidies is easier than standardizing the measurement and evaluation of R&D projects' because they tend to be so unique.

Campbell (1996) argues that planners in their attempts to rectify market failure and induce economic development, tend to work within the tension generated among

three fundamental aims, collectively dubbed the planner's triangle, with sustainable development located at its center. The center cannot be reached directly but only indirectly and approximately through a sustained period of confronting and resolving the triangle conflicts. Campbell argues that sustainability needs to be redefined as an integration of social equity, economic development, and environmental protection.

Campbell (1996) stresses the need for economic growth revitalization but points out that only with fair distribution of the generated income will the current poor of the world be more likely to put in their share of protecting their environment. The essential question connecting sustainability and economic development policy is whether sustainability is a useful concept for planners. Campbell also warns against sustainability becoming merely a semantic phenomenon, where the word sustainable is added to every economic development plan without actually identifying how to measure sustainability. To define sustainability, however cumbersome, does not automatically mean to know it. Yet sustainability can be a helpful concept in that it posts the long-term planning goal of a social environmental system in balance.

Costanza (2000), on the other hand, adds to the conventional model of the economy, and renames within it, several elements such as ecological services, waste, solar energy, social capital, individual and community wellbeing…etc. He underscores the importance of realizing the extent of the subjectivity involved in setting long-term economic policy and concludes his paper by advocating a precautionary policy, to be set, that assumes limited natural resources and fundamental uncertainty about the limits of technology.

# Chapter 3: Multinational Corporations and the Business Case for Sustainability

## 3.1 THE BOTTOM LINE

*"When viewed within the context of sustainable development, environmental concerns become not just a cost of doing business, but a potent source of competitive advantage. Enterprises that embrace the concept can effectively realize the advantage: more efficient processes, improvement in productivity, lower costs of compliance, and new strategic market opportunities. Such businesses may expect to reap advantages over their competitors who lack vision. Companies that fail to change can expect to become obsolete" (* Holliday, Schmidheiny and Watts 2002, Page 15).

Multinational corporations with their global presence should be the entities most capable of promoting the principals of sustainability. Unlike many governments, multinationals have interests and influence that go beyond national borders. Many multinational corporations already have environmental management systems (EMSs), pollution reduction, and energy saving practices in place. However, environmental pollution and global warming remain an issue and social and economic development continues to lag behind in many parts of the world. There are many reasons for this very slow manifestation of SD as an international initiative.

Bob Willard in his 2002 book *The Sustainability Advantage* (Page 11) argues that one of the reasons for the lagging corporate endorsement of a comprehensive social, economic, and environmental approach to SD, is that there is no appropriate business case quantify the opportunities. Furthermore, Willard argues that most of the low hanging fruit has already been picked. The easy energy and waste savings have

already been applied to the companies' bottom line. There are also many programs already in place for further waste and energy usage reduction. However, the law of diminishing returns is bound to set in after all these reductions are made. Willard argues that to continue to reap the bottom line benefits from environmental initiatives, companies must reframe their environmental strategies in the broader context of sustainable development. Companies can not continue to treat environmental aspects in the same way they treated quality in the 70's and 80's, as a specialized staff concern; something that a special unit in the organization worried about while the rest of the organization continued the real profit making business. Environmental compliance, like quality control should be an integral part of all the company's operations.

There is mounting evidence that the long-standing trade-off paradigm between economic success and environmental and social goals is very flawed (Barton, Brady and Rowledge 1999). The authors argue that their research has shown that improving environmental and social performance leads to enhanced profitability and value, cost reductions from eco-efficiencies, waste reductions and process improvements, price premiums for those first to market, enhanced brand equity and customer loyalty, lower cost of capital because of reduced risk, increased revenue from new products, markets and businesses and better asset management. Moreover, first-class environmental and social performance lead to higher employee job satisfaction, less turnover, increased innovation and creativity and motivation from a higher sense of purpose.

A perfect example of this is how DuPont turned its international leadership in safe industrial operations into a new profit-making venture. In 1997, DuPont decided to pursue a sustainable business approach in a number of key areas. After 200 years of operating, the company had a proud workplace safety and health record and was

regarded as one of the safest companies in the world. DuPont built vast safety and health knowledge in a huge variety of fields that mirrored the diversity of its operations. The company decided to explore the business possibilities of using and building on that knowledge. This lead to establishment of a new business unit - DuPont Safety Resources (DSR) - in 1999, based on marketing the company's extensive knowledge of workplace safety and health solutions globally. It is only natural that companies are not in business to solve the world problems, nor should they be. After all, they have shareholders that want to see a return on their investment. However, companies that take the lead may reap the benefits of not squandering shareholders money by underestimating when it pays to be green. (Forest Reinhardt 1999)

The core philosophy behind business interests in modern day multinational corporations stem from the 18th Century thinkers of the Enlightenment period in Western Europe. John Locke, whose work later inspired Thomas Jefferson's American Declaration of Independence, outlined a political theory based on the deduction of the rights to life, liberty and property. Based on the same concept of freedom of choice, Adam Smith, the father of modern economics, argued that free markets provided the ultimate solution. If every one acted to maximize their own economic self-interest, the invisible hand of the market would bring about the most efficient distribution of resources.

Both Smith and Locke believed that self-interest was natural, but could be harnessed for the general good. Corporations therefore are expected to aim at maximizing profit out of running business operations. Maximizing profit, however, does not necessarily exclude contributing to the general good. Ironically, recent

research has shown that corporate commitment to ethical issues such as equity or environmental concerns can also pay off financially.

In addition, an economist and champion of free trade, Jagdish Bhagwati (2000) wrote, "*Adam Smith's Invisible Hand will guide you to an efficient allocation of resources only if markets yield prices that reflect true Social Costs. If there are market failures when a producer pollutes the air but does not have to pay for his pollution, then the Invisible Hand can lead you in the wrong direction. Or to put it in flamboyant terms it can immiserize (impoverish) you*." Therefore, looking at the corporate financial bottom line demanded the incorporation of social and environmental costs. Moreover, a strong belief emerged among the business community, after the 1992 Rio Earth Summit, that businesses had an important role in forging the path towards sustainable development. This led to the permanent formation of the WBCSD (World Business Council for Sustainable Development).

Furthermore, Holliday, Schmidheiny and Watts (2002, Page 19) state that the mid 1990's was an era of changing priorities. "*In the earlier manifestations, sustainable development was largely a green agenda. It was not that the companies suddenly noticed that they were ignoring the social side of the concept; it was more than that, many companies problems were shifting from being environmental to social. There were charges of exploitation because of their use of child labor and because they were running sweat shops, were union bashing and were being particularly nasty neighbors "out in the bush" where a mining or oil company might be the most powerful institution around*". Whether as an effect of various scandals or as a cause, polls were showing that consumers were becoming as concerned with companies' worker-rights records as their records on the environment and animal welfare (Gallop 1995).

The social side of sustainable development became more pressing and requiring of immediate attention than the environmental side and considering that the social side was more concerned with the needs of the present, the WBCSD focused on integrating CSR (Corporate Social Responsibility) issues into business strategies and everyday business activities.

Literature tends to support the link between the business bottom line and all three pillars of sustainability. "*Businesses are ultimately interested in one thing: profits*" the Economist magazine stated in an article on globalization. "*The business bashing NGOs are right about that. If business think that treating their customers and staff well, or adopting a policy of corporate social responsibility or using ecological friendly stationary, will add to their profits they will do it. Otherwise, they will not…. If firms have to compete with rivals for customers and workers, then they will indeed worry about their reputation for quality and fair dealing-even if they do not value these things in themselves. Competition will make them behave as if they did*" (Economist 2001h:4)

The business case for sustainable development depends on making a profit or shareholder value case for the corporate pursuit of sustainability. However, companies tend to get involved in activities long before they can prove the business case for doing it. The business case for TQM could not be made in the 70's nor the IT movement in the 80's. This is true of any major trend in the history of business over the past 20-30 years. Before an idea begins to gain traction among the leadership of companies, there is always a fierce debate on the business case. Various industries are coming to the same conclusion, a sustainable development approach brings value to the company, and it is only a matter of time before companies realize that (Gilding 2003).

Although the business case for sustainability started as anecdotal more than factual, a growing number of studies show a link between the profitability of a company and its pursuit of social and environmental goals. **However, one needs to be careful not to aspire to "prove" that pursing sustainability goals makes a company more profitable. There are too many variables involved, and correlation does not necessarily mean causation.**

Nevertheless, a report published by SustainAbility (a London based consultancy) and UNEP in 2001, states that sustainable development performance does not detract from a firm's obligation to its stakeholders. Thus, it appears that the impact of sustainable development performance on stakeholder value is typically neutral at worst and in some instances has been shown to add considerable value.

Most importantly the report argues that sustainability performance of a company matters a great deal in that shareholders value is driven by brand value and reputation, risk profile and customer attraction, all of which are among the "intangible assets" that define sustainable development. The impact of sustainable development performance on shareholder value is likely to be long term. Day traders will not be looking for companies with strong sustainable development performance. The more a company can demonstrate the anticipated benefits of sustainable activities and or investments, the more likely the market will recognize these links. The bottom line is *if investors believe it to be true, it will be true*.

Furthermore, business consultant KPMG reports that the corporate world has seen a marked increase in awareness of sustainability issues in due diligence investigations associated with various financial transactions. Also a niche in the

financial markets is growing exponentially. It specifically targets investment in sustainable companies through a variety of sustainability funding mechanisms.

The business case for sustainability was very eloquently stated by Andy Grove president of Intel "the balance of forces must shift from the old structure, from the old ways of doing business and the old ways of competing to the new ... that transform the very essence of how business is conducted in an industry". On the other hand the connection between sustainable practices and capital investment was summarized by McDermott and Stainer in their 2002 article 'Environmental sustainability and capital investment appraisal'. In the article, they argue that strategic decision makers, when appraising capital investments, are becoming constantly aware of their environmental responsibilities – a major challenge in an era of more discerning and well-informed stakeholders.

"*Indeed, it is one that must be positively confronted in a dual momentum for competitive advantage as well as for the sustainability of the earth's limited resources. The ethical and economic link between capital investment and environmental sustainability is undeniable and requires urgent attention from business and government"*. (McDermott and Stainer 2002)

### 3.2 THE DOW JONES SUSTAINABILITY INDEX

"*The investment community is beginning to recognize the new commercial and environmental realities and to make money out of them. The return on equity of the Dow Jones Sustainability Group Index averaged 15 percent compared to 8 percent for the regular index for the first half of this year*" (Blair 2002).

In 1999, the Dow Jones Sustainability Group Index was launched. The DJSI is a stock index that tracks the performance of the top 10 percent of the leading

sustainable companies in the Dow Jones Global Index. Over its 5 years life span, the index is claimed to have changed the global asset management business. (Holliday, Schmidheiny, and Watts 2002, Page 30)

The DJSI includes companies on the basis of best-in-class sustainability in terms of financial, environmental and social performance. In the first 12 months, l6 licenses to use the index were issued to a wide variety of financial institutions in seven different countries. These licensees created many financial products, including active and passive funds, equity baskets, and certificates. By the end of 2000, assets totaling approximately €1.5 billion ($1.3 billion) were managed directly based on the index or used it as a portfolio performance benchmark. (Sander 2000)

Sander also stated that from January 1999 to September 2000 the index generated a rate of return (in euros) of 59.2 percent. He claimed that the DJSI appeared to be the beginning of a movement from qualitatively driven socially responsible investing to quantitatively driven sustainable investing. The DJSI provided portfolio managers with a means to use the sustainability ranking of individual companies as a decision tool to modify their stock holdings. The best companies associated with better sustainability performance could more easily be identified in many industrial sectors. Moreover, The DJSI provided hedge funds with an ability to employ a 'pairs' stock trading strategy by, for example, going long on an energy company with a high sustainability rating while shorting a company with a low sustainability rating in the same sector.

### 2.5.3 Walking the Talk

Chad Holliday (Chairman and CEO of DuPont), Stephan Scmidheiny (Chairman Anova Holdings AG) and Phillips Watts (Chairman of the Committee of Managing

Directors of the Royal Dutch/Shell Group of companies) coauthored a book published in 2002 prior to the Johannesburg Earth Summit, entitled "*Walking the Talk, the Business Case for Sustainable Development*". This book, whether it was a calculated publicity stunt or a genuine effort to promote sustainability issues, was the first of its kind by corporate leaders. Furthermore, it was a clear statement that the fortune 100 conglomerates were recognizing the importance of having and displaying a sense of commitment to sustainability issues. The book was the culmination of the work of the WBCSD, which was established largely to promote the business case for sustainability.

Holliday, Scmidheiny and Watts present data showing the DJSGI companies consistently outperforming the DJGI in bull and bear market situations over the past 5 years. (Figure 3.1)

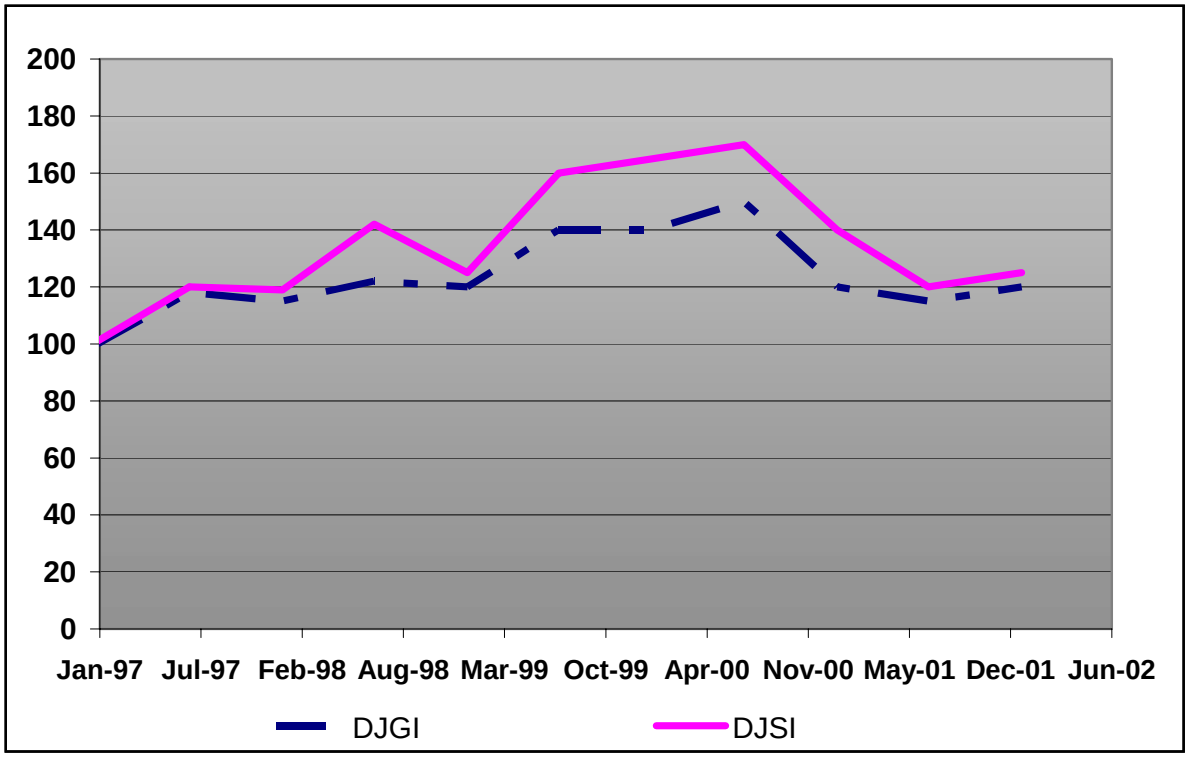



Figure 3.1: Performance History of the Dow Jones Sustainability Index (DJSI)-World. Source: Walking the Talk.

The Dow Jones Sustainability Group Index (DJSGI) continues to be a family of indices used to identify and track the performance of sustainability run companies. It has outperformed the more generalized Dow Jones Global Index (DJGI) with respect to market capitalization growth. Corporations, Government organizations and agencies often refer to the DJSGI for illustrating that integrating economic, environmental and social factors into the operations and management of a company increases shareholder value and business activity transparency. The DJSGI is also used by global corporations to legitimize the efforts they put into sustainability.

### 3.3 SUSTAINABILITY AND THE CONSTRUCTION SECTOR

The built environment normally constitutes more than half of total national capital investment worldwide, and construction represents as much as 10 percent of GNP. With its estimated 111 million employees, the construction industry may be the world's largest industrial employer, accounting for approximately 28 percent of all industrial employment. In many developed countries, construction accounts for up to half of all the raw materials taken out of the earth's crust by weight as well as producing a considerable waste stream. Fortunately, a significant and growing proportion of this is recycled. In addition to providing significant opportunities for employment world wide, one of its fundamental roles is to maintain and improve the quality of the built environment, which in turn significantly influences the quality of life of citizens (UNEP Report 2002).

It also a well-known fact that some types of construction projects are controversial. New roads in picturesque countryside and dams in the developing world typically attract fierce debate on either sides of the spectrum, growth versus preservation and progress versus community values. Although the industry and market forces tend to decide, what gets built and where, the local communities' acceptance and society at large determines the success of such ventures and projects. Construction development decisions, whether in the industrial, the infrastructure, or the housing sectors, require a process of tradeoffs between sustainability issues and the need for the facilities. Building professionals share the responsibility with developers in ensuring that projects are built in such a way as to minimize environmental impacts. This process is referred to as 'sustainable construction'.

The United Nations Environmental Program (UNEP) 2002 Report "*Industry as a Partner for Sustainable Development"*, argues that in addition to the construction industry being the foundation for capital investment in the industrial, infrastructure and housing sectors, it is also a major venue of energy consumption. In Europe, the built environment accounts for almost 40% of energy use (including materials production and transport). This implies, the report attests, that the built environment (including transport in the United States) is the largest single contributor to greenhouse gas emissions. The significance of the construction industry in all sectors of the economy and its huge effect on social wellbeing and environmental concerns makes it a very important and high impact area for improving sustainability.

Although operating industrial projects produces the bulk of the alarming emissions, the actual construction operation of erecting buildings and bridges presents significant possibilities to reduce waste. Building design can be focused on reducing emissions from buildings through their life cycle via increased energy-efficiency measures, and in the longer term through the exploitation of renewable energy resources. Many technologies already exist to facilitate waste and emission reduction, the problem is the perceived economic deterrence to changing the way we build. Future advances aimed at reducing the relative costs of renewable energy will also facilitate the move towards more prudent construction.

Moreover, UNEP's report states that renovation and maintenance now constitute an ever-growing share of construction markets, especially in the developed economies. "Sustainability" infers that demolition has now typically become the last choice in preference to renovating existing structures whenever feasible. Caution should be taken when considering maintenance work as a sustainable option, since renovation may

sometimes be relatively cheaper and hence the business choice, but might produce more loses in the long-term life of the asset. Although the industry is mainly made up of small and medium-sized firms, an increasing number of construction firms continue to seek ISO 9000 quality management standard Certification and ISO 14000 environmental management standard certification. In addition, the industry is experiencing consolidation in order to manage increasing regulatory, IT infrastructure, and other emerging costs of doing business.

UNEP's Report touches on the importance of improved supply chain management as well. It proposes the integration of increasingly environmental and social aspects into public procurement procedures. Industry studies often show much interest in these areas. The report recommends giving particular attention to recycling and re-use of waste materials and to the whole-life costing and life cycle analysis of construction projects. Environmental product declarations for construction materials as well as 'environmental labeling' of construction products is being slowly developed.

The UNEP Report also attests that Research and Development (R&D) is increasingly being focused on sustainability issues, especially the development of renewable energy sources for applications in buildings. Finally, the report clearly points out the recognized industry need to develop a set of sustainability indices, against which it can benchmark its performance towards increased sustainability.

The report highlights some difficulties that persist with obtaining the necessary data and statistics to support these proposals. Collecting and modeling some statistical data regarding the impact of sustainability awareness and effort geared at sustainability on capital project performance, should complement efforts at quantifying the business case for sustainability, hence facilitating further creation of various relevant and

specialized sustainability indices within the construction industry. This was the rationale for the main objective of this research.

### 3.4 SUSTAINABILITY STRATEGIES AND TACTICS

Several interesting conclusions could be drawn from the master's thesis, Analyzing Environmental Sustainability Strategies and Tactics Applied by Industry Leaders (Bolivar 2004). The conclusions most relevant to this dissertation include:

- The greatest environmental Impact (>80%) is being carried out through Owner Commitment and the integration of a Benchmarking and Metrics strategy. The study found that this strategy ties in closely with the use of information-intensive environmental management systems, certification of industrial projects to ISO 14000 standards and increasing participation in voluntary reporting programs.
- In the Planning phase of projects, in addition to environmental regulatory compliance, additional positive environmental impact is resulting from the project teams that are committed to environmental sustainability.
- In the U.S., according to the research findings, construction phase efforts focus mainly on decreasing material waste.
- The impact on the environment due to facility construction is undermined by the impact during the Operations phase of facilities. The environmental impact of construction phase activities, albeit considerable, is overshadowed by the impact of the operation of the facility during its life cycle.
- Finally, the study recommends further research to develop sustainability indices – Organization Index, Project Index, and Facility Index

# Chapter 4: Research Methodology

Figure 1.2 illustrated the research methodology used in this study. The research was initiated in August 2003 with the realization of the need for sustainable construction indices and more research to examine the business case for sustainability. The following chapter will discuss the sustainability indicators used to create the two indices and explain each step in the research effort including the survey questions and computation algorithm.

## 4.1 SUSTAINABILITY INDICATORS

Any accurate measurement of sustainability commitment needs to address the three pillars, economic, social and environmental. Thus, it is very important to develop the research methodology based on the issues underlying all the pillars. The definition of indicator is an operational representation of an attribute (quality, characteristic, property) of a system (Gallopin 1997) while data are actual measurements or observations of the values of the indicators (Morse and Bell 1999). An index is an amalgam of more than one indicator (Liverman, et al. 1988). Indices are also viewed as signs or signals to measure a status or predict an outlook.

As mentioned in chapter 1, the research hypothesis is that higher balanced commitment to the three pillars of sustainability (social, economic and environmental) leads to better, more sustainability conscious planning, which in turn leads to better cost and schedule predictability in large industrial projects, by reducing the risk encountered in the project execution. Corporations that are more aware of and more committed to sustainable corporate and project practices should have relatively better capital

controlled costs and schedules. This is especially the case when that commitment is reflected on the level of planning for sustainability related risks in capital projects.

During the early development of this research, the use of the existing and extensive Construction Industry Institute (CII) benchmarking and metrics data was contemplated. CII data has been collected from industrial owners and contractors over the past 8 years and includes the Pre-Project Planning Index (PPI) and cost and schedule predictability data. The Pre-Project Planning Index consists of a couple of lead-in questions and the abbreviated Project Definition Rating Index (PDRI). After examining the existing benchmarking and metrics data, the need to develop a tailored Sustainability Component of Project Planning Index (SCPPI) to complement the Corporate Sustainability Commitment Index (CSCI), was apparent. Albeit more time consuming, the need for consistency in the data and accuracy in the research premise dictated this different approach.

Furthermore, most of the recent complete benchmarking and metrics data was from organizations that did not boast identified sustainability units with clear SD policies and practices. Therefore, the initial list of 38 fortune 100 companies was retained as the base for the survey validation and later the data collection process. A Corporate Sustainability Commitment Index (CSCI) was developed and a Sustainability Component of Project Planning Index (SCPPI) was developed to take into account the sustainability related practices during project definition. Moreover, each multinational organization was asked to complete a survey measuring their corporation's CSCI, and the level of sustainable practices implementation at project planning (SCPPI) for one project. Each organization was also requested to provide the completed cost and

schedule performance data for that one project. Reference to the existing CII cost and schedule data was minimal.

Figure 4.1 illustrates the research premise concerning the relationship between the two indices and project performance. Top management buy-in on sustainable practices (as measured by the Corporate Sustainability Commitment Index CSCI) should filter down to best practices at the project planning level (as measured by the Sustainability Component of Project Planning Index SCPPI). This should in turn affect project performance (as measured by Cost and Schedule Predictability). The higher the commitment at the top, the better and more sustainable the planning and definition of capital projects, and the higher the chances of project success.

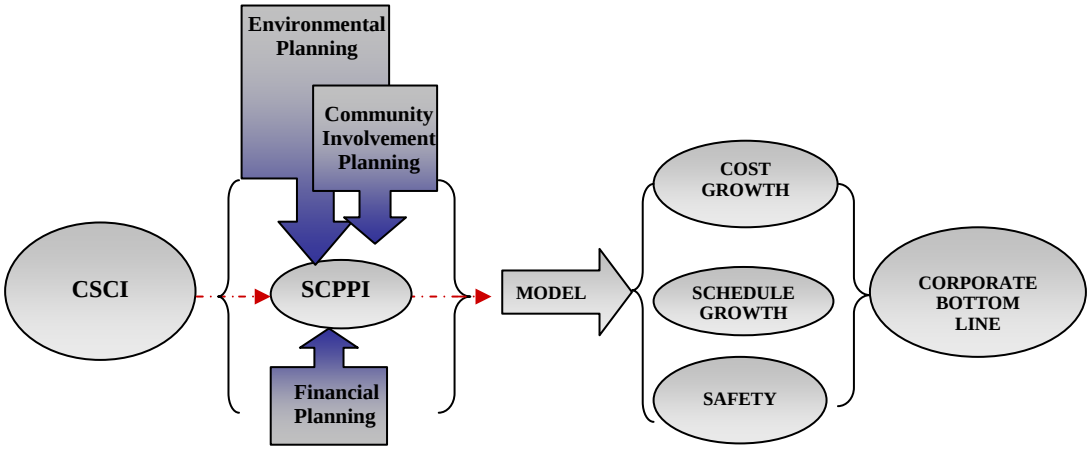



Figure 4.1: Research Premise of Indirect Influence of Sustainable Practices

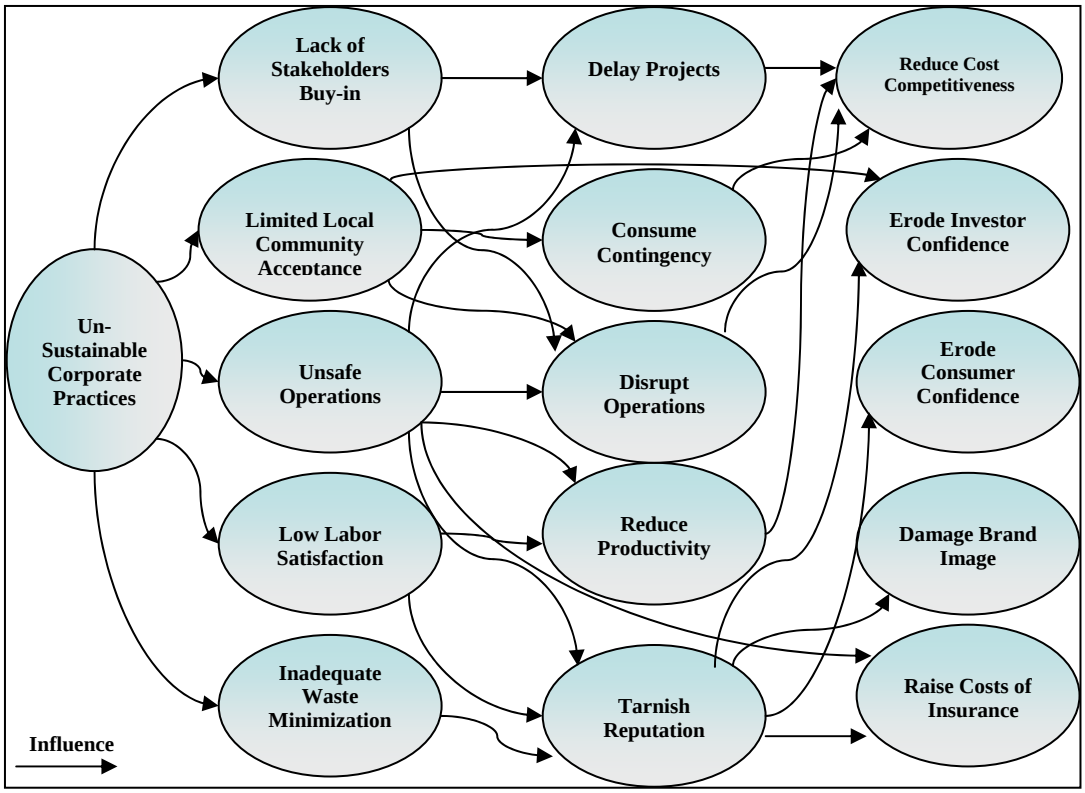



Figure 4.2: Hypothesized Influence Diagram for Impact of Unsustainable Practices

Figure 4.2 on the other hand illustrates the hypothesized causal links between sustainable development concerns and project risks. Sustainability is the umbrella under which many ethical financial practices, philanthropic community development activities, and environmental compliance strategies fall. The influence diagram suggests that corporations that are not diligently pursing a sustainable agenda are reducing the value of their investments and hence their competitive advantage. For instance, lack of stakeholder buy-in disrupts operations, reduces productivity and delays projects. Similarly, unsafe operations, reduce productivity, increase labor turnover, tarnish reputation and increase cost of insurance and the cost of capital.

### 4.2 SURVEY DEVELOPMENT

The research framework of sustainability indicators was developed to address the three conventional pillars of Sustainable Development. These indicators were then compounded to form one empirical index that could be correlated to project performance. A detailed questionnaire, modeled on the Dow Jones sustainability Index but tailored to assessing sustainability issues affecting capital project performance, was initially created to collect data on the Corporate Sustainability Commitment Index (CSCI).

The original questionnaire was 113 questions long (Appendix A). A research discussion session with 10 industry project professionals and leaders was held at the CII Annual Conference in Vancouver (July 2004). Their input was used to enhance the questionnaire format and the "doability" of the research. Moreover, a number of industry sustainability professionals were consulted on the survey format before the start of data collection. It was deemed necessary to condense the questionnaire before collecting data. Only the issues most likely to have a stronger impact on capital project performance were included in the final version of the survey to make the research doable and to attain the desired participation from member companies. After several iterations, the final version of the survey was produced in a succinct Likert Scale form that is user friendly (Appendix B).

Furthermore, a supplementary Sustainability Component of Project planning Index (SCPPI) was created and added to the original survey. The SCPPI was designed to measure the degree of integration of sustainability practices in capital projects planning. Project planning is the process of developing sufficient strategic information with which owners can address risk and make decisions to commit resources in order to

maximize the potential for a successful project. The concept of project planning involves understanding the project environment, putting together the project team, selecting technology, selecting project site, developing project scope, and developing project alternatives. Project planning also involves exploring the relevant regulations and permitting processes that might hinder the progress of the project.

The SCPPI focused on the degree of preparedness to face sustainability related risks at the time of project authorization. The SCPPI was designed to mirror the structure of the CSCI and was collected on the same survey. The third section of the survey focused on collecting project performance data, including cost deviation, schedule deviation, design and scope changes, and safety statistics.

Positive feedback was received regarding the final version of the survey and it took the respondents an average of 1 hour to complete, unless they needed to dig deeper for project data or wait on responses from other members of the organization. In the following sections, the survey questions from the three pillars will be explained and the survey algorithm will be described.

### 4.3 THE SURVEY FORMAT

A complete copy of the final version of the survey is provided in Appendix B. The first section of the survey solicits general corporate information and information on the sustainability or Corporate Social Responsibility (CSR) unit. The general corporate information section includes the company name, the headquarters location, and the major industry involvement. By major industry involvement, the corporations could identify their major areas of operation, with oil and petrochemical, pulp and paper, automotive assembly, consumer products, microelectronic manufacturing,

pharmaceutical manufacturing or specialty chemicals. The survey also requests the respondents contact information.

The sustainability or CSR unit survey extracts information that would help the researcher understand the size of the unit. The size of the unit should represent the weight the corporation puts on sustainability. This section also gathers information on the existence or lack thereof of a formal sustainability policy at the company and the main areas of sustainability that are viewed as strategically important. It also solicits information on the auditing and benchmarking effort at the company. This question is repeated in more detail and varying format later in the survey. The survey also asks about the corporation's membership of the Businesses for Social Responsibility (BSR) organization to build a clear picture about the degree of filtration of the concept of Sustainable Development in the relevant corporation.

### 4.3.1 Corporate Sustainability Commitment Index (CSCI)

The CSCI section of the survey contains questions on the three pillars of sustainability (economic, social, and environmental). For user friendliness, the whole survey was set on the Likert scale with 1 (low) to 5 (high). The Likert technique presents a set of attitude statements. Respondents are asked to express agreement on a five-point scale with different taxonomy for maximum and minimum agreement in different sets of questions. Each degree of agreement is given a numerical value from one to five. Each question also has the option to answer not applicable (NA) or unknown (UNK). Thus, a total numerical value can be calculated from all the responses to create the index. All questions were weighted equally for this first stage of the research. In the following pages, each section will be discussed and the justification for the questions will be explained.

### 4.3.2 The Economic Pillar

Subsection A of the economic pillar part of the survey is top level corporate organization and the resultant strategic sustainability planning. In this section the respondents are asked to rate the degree to which CSR is the responsibility of the Board of Directors. The higher the response the more likely CSR is a high profiled notion in the related organization. The respondents are also asked about top management's attitudes towards sustainable development as a risk-mitigating tool, and whether they expect to see mass resignations in the event of an image-damaging crisis. Furthermore, the survey asks if the organization has a comprehensive formal and documented roadmap for reacting to an image-damaging crisis.

Subsection B asks about how often the connection is made at the corporate level between sustainability and investor relations. The section assesses the frequency of sustainability awareness and training at the company, the regularity by which the company conducts Investor Perceptions Studies (IPSs) and how far down in the corporation are these perception studies disseminated. Investor community perception studies are perception audits that take the full measure of investors' attitudes toward the companies in which they invest their portfolio money. Perception studies can be very useful to corporate officers, who use the data to work out how Wall Street perceives their high visibility initiatives, such as product launches, top management turnover or sustainability programs.

Subsection C asks about the frequency of sustainability benchmarking in the corporation. Sustainability benchmarking is the corporation's method of identifying where it stands in terms of sustainable development efforts. It is important to know where one stands, to be able to assess where one may head. The sub-section also asks

about any other project benchmarking efforts and whether the results of the benchmarking are disseminated within the organization to obtain buy-in at all levels.

Subsection D deals with customer satisfaction and brand loyalty reviews. This subsection of the survey aims to assess the importance of brand name in the organization. Corporations that invest considerably in their brand name stand to lose far more from reputation and image damaging crisis. With more at stake, more is typically invested in the preventative measures that sustainable development advocates.

Finally, subsection E reviews the corporations marketing policies. This section was designed with pharmaceutical companies in mind and other companies were given the option of choosing NA. Many pharmaceutical companies tend to follow the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) marketing practices. IFPMA is a non-profit, non-governmental organization (NGO) representing national industry associations and companies from both developed and developing countries. Member companies of the IFPMA are research-based pharmaceutical, biotech and vaccine companies. IFPMA advocates policies supporting intellectual property protection, fair market competition, drug regulation, and equal access to information about new medication.

### 4.3.3 The Social Pillar

The social pillar section of the survey covers eight major areas. Starting with ethics and codes of conduct within the organization, to stakeholder identification, labor practices, and health and safety plans. Moreover, the section also assesses human capital attraction and retention, philanthropy, R&D, bioethics and improving drug access in developing countries.

Subsection A reviews the comprehensiveness of the code of conduct at the corporation. Issues that have been recently added to the ethics codes in multinationals like whistle blowing are assessed. Moreover, the survey explores the degree of the application of the code to contractors and suppliers. Subsection B addresses stakeholder identification with emphasis on adequate acknowledgment of local communities and indigenous people. The subsection also assesses the frequency of use of Social Impact Assessments.

Subsection C addresses labor practices, and the organizational awareness and compliance with the International labor Organization (ILO)'s conventions. This includes fair labor policies and the existence of formal mechanisms allowing employees to report violations without retaliation. Moreover, the corporation's awareness level of The Organization for Economic Cooperation and Development (OECD)'s guidelines for multinational Corporations are assessed. OECD is a group of 30 member countries sharing a commitment to democratic government and the market economy. The OECD plays a prominent role in fostering good governance in the public service and in corporate activity.

Subsection D examines whether the occupational health and safety policy at the organization is externally audited. External auditing, similar to the role OSHA plays in the USA, is essential to maintaining the rights of employee and reducing safety incidents on large industrial projects. This subsection also solicits responses on the degree of infiltration of safety consciousness in the corporate culture. Subsection D on the other hand reviews the effectiveness of the corporation's human resource policy in attracting and retaining talent. Attraction and retention of talent is a vital backbone of corporate governance.

Subsection F assesses Research and Development (R&D) investment as a percentage of annual working capital. The higher the percentage the more likely the company is pursuing innovative technology and exploring new techniques to be competitive. This section also assesses if the company is funding any research activities to combat diseases in developing countries, such as aids and malaria. The latter part is more applicable to pharmaceutical companies, but many oil and petrochemical multinationals also reach out to the communities that they develop oil fields in, to help with the pressing needs of health and disease treatment and prevention. Subsection G is also more geared towards biomedical and pharmaceutical companies and addresses concepts such as fair sharing of access to resources in host countries, improved access to drugs in developing countries and the organization's formal policy on animal testing.

Finally, subsection H addresses philanthropic efforts by the organization. This section measures the degree to which the company monitors the impact of its philanthropic efforts. Spending money to fund programs, without a clear follow up plan to ensure the money is reaching the underprivileged people it was intended for, reduces the effectiveness of goodwill.

### 4.3.4 The Environmental Pillar

The environmental pillar reviews three major sustainability indicators. The first indicator is the corporation's use of Environmental Impact Assessments (EIAs). The second indicator is eco-efficiency. The third indicator is environmental leadership.

Subsection A explores the frequency of use of EIAs. It also examines closely the quality of the assessments. This section reviews if the company includes the reduction of CFC's contributions as one of their goals in a project. Moreover, the survey asks about the frequency of use of ISO certified Environmental Management Systems

(EMS). Subsection B addresses the company's reduction targets for eco efficiency, waste generation, and energy consumption. Subsection C on the other hand looks into the corporation's environmental leadership. The degree of visibility and prominence of the environmental unit in the organization predicts the degree of commitment of top management to the green environmental agenda.

### 4.3.5 Capital Project Data

In this section, data is collected on the SCPPI and project performance for one specific sample project. SCPPI is designed to reflect the degree of integration of sustainability practices in project planning. The subsections of the SCPPI follow the design and content of the CSCI and all questions to reflect a snapshot of planning effort at the time of submittal of the Authorization For Execution (AFE) documentation to top management for approval.

### 4.3.6 SCPPI

#### 4.3.6.1 The Economic Pillar

Subsection A assesses the status of preparation and documentation of the project specific financial transparency guidelines. The subsection also examines the degree of interaction between the project team and the business unit. Business unit involvement is a direct measure of the reflection of investor interests in capital project investments. Subsection B assesses the degree of completeness of Investor Relations Studies (IRS)s, while subsection C examines the degree of completeness of sustainability benchmarking studies for the location of execution of the capital project and whether outside consultants are utilized in assessing the sustainable development risks. Outside consultants refer to independent consultants or consultants that are not permanently

employed by the multinational. This is a very valid concern when executing large capital industrial projects in high-risk locales. Subsection D on the other hand, looks at the status of brand loyalty reviews at project execution. Brand loyalty reviews help assess the impact of the capital investment on brand name. The better defined the risks surrounding the image and brand name of the company; the better it would be at mitigating the risks.

#### 4.3.6.2 The Social Pillar

The social pillar questions address the degree of completeness of the corporate code of ethics at the time the project was planned. It also addresses the degree of stakeholder identification at the time the project was scoped. Excluding legitimate stakeholders from the decision making process can instigate late and costly scope and design changes. The survey also addresses the status of health and safety plans. The social pillar also examines human resource management plans, especially the plans for the attraction of retention of talent to work on the project during execution and to sustain profitable long-term operations.

Furthermore, the survey addresses commitment at the planning stage of the project to fair R&D practices, such as sharing resources and findings with host country. The degree of completeness of the projects accompanying philanthropic plans is also assessed in this section. Moreover, the section examines the status of plans, at authorization, to improve drug access in developing countries or the relevant local communities during the execution of the project.

#### 4.3.6.3 The Environmental Pillar

The environmental pillar of the SCPPI looks at the degree of environmental planning that goes into the capital project before authorization. Environmental compliance with regulations and environmental permitting can at the least delay a project and the worst bring it to a halt. Therefore, it can be easily seen that the degree of progress in obtaining environmental permits can be crucial to setting an accurate project cost and schedule baseline. The subsections of the environmental pillar also deal with the status of plans for controlling emissions and reducing waste from the capital project asset development.

### 4.3.7 Project Performance metrics

Project performance metrics are project success parameters generally agreed upon by the project management professional body. Cost deviation is defined as a *{(Actual Total Project Cost - Initial Predicted Project Cost)/ Initial Predicted Project Cost}.* Initial project cost is the project estimate highlighted in the Authorization for Execution Documents and approved by top management. Industrial capital project costs cover all overhead costs, the costs of project planning and definition, detailed engineering, procurement and purchasing, and construction and startup. Capital costs typically include all capitalized costs of the project and exclude expensed costs. The differences between capitalized and expensed costs are technical and depend totally on corporate accounting systems. On the other hand, actual costs cover the reported costs of all phases of the project after the project is completed.

Schedule growth on the other hand is measured as *{(Actual Total Project Duration - Initial Predicted Project Duration)/Initial Predicted Project Duration}.*

Project duration spans from the formation of the project team to pursue a business idea to a steady state operation of the industrial asset. This covers the five major phases of project development (definition, detailed engineering, procurement, construction, and startup). Initial project duration is the baseline duration set by the project team after reviewing the work break down structure (WBS) and producing a detailed network analysis. It is produced at the authorization stage of the project to provide top management with realistic expectations of the duration of the project for financial decisions. Actual project duration is the real time in which the project is executed.

Design Changes are measured in the survey in terms of the ratio of the cost of the design changes against the cost of the total project. They are also measured in terms of the net addition or reduction caused by the design change on the schedule compared to the initial project duration. No data was provided on these two parameters, therefore no analysis is performed on design changes in this dissertation.

Safety is measured in terms of OSHA Recordables (RIR) and Days away from Work, Restricted, and Transferred (DART). {*RIR = (Total Number of Recordable Cases x 200,000)/Total Site Work-Hours*}. {*DART=Total Number of DART Cases x 200,000)/Total Site Work-Hours}*. Unfortunately, very limited data was obtained in this section since most companies did not follow the exact OSHA format because either they were internationally based or the projects were executed internationally. Hence, no analysis was performed on safety in this study.

### 4.4 SURVEY ALGORITHM

Both the CSCI and the SCPPI indices are based on a scale of 1-10 for convenience, with 1 being the lowest point and 10 the highest. Cost and schedule performance are measured in terms of percentage deviation from baseline. All the

questions are currently weighted equally. In the future, more impact analysis will be performed on a larger data sample and the questionnaire-weighting algorithm will then be revisited. Depending on the results of future analysis, the use of AHP (Analytical Hierarchy Process) techniques will be considered for assigning final weights. Please refer to Appendix C for a detailed illustration of the indices calculations algorithm on a sample project.

### 4.5 IDENTIFYING POTENTIAL RESPONDENTS

A mix of Sustainable Development and project professionals from the 38 chosen companies were identified and a plan was set for contacting them for input. Based on the research schedule, the data collection took place over a period of six months, making use of slower paces at most owner corporations during holidays. However, enticing respondents to participate in this effort was challenging in part because of the lack of an official confidentiality agreement between UT and the respective companies. To counteract that, respondents were asked to mask their project identities. Moreover, publication of the data will be in aggregate form and none will refer to or single out any corporation or project in a way that may expose the identity of the company or the project.

### 4.6 DATA COLLECTIONS AND RESPONSES VALIDATION

After reviewing the received completed questionnaires, teleconference data collections took 2-2.5 hours per company. Although the questionnaire was sent to all participants ahead of time, a considerable amount of follow-up was needed to improve the quality of the data. After completing the data validation, a copy of the cleaned up questionnaire was returned to the participant for feedback.

The responses were rigorously validated by consulting online and published corporate documentation, including annual financial and sustainability reports. References were also made to oil industry news wires (such as "webbolt news") and various news articles about the sustainability efforts of the specific multinationals we studied.

The survey was completed and/or the responses adjusted in contentious questions to reflect the documentation. The following three examples illustrate this validation process.

- Example 1: Company X reported annual philanthropic expenditure as 5 percent of its annual operating capital. After consulting the company's annual financial reports and annual sustainability reports, it was apparent that philanthropic expenditure actually averaged 2 percent over the past 3 years. The questionnaire was adjusted to reflect this.
- Example 2: Company Y is one of the largest oil and petrochemical multinationals in the world and carries out oil exploration and development operations in many developing countries. Its inadequate community development efforts have been widely criticized despite its latest efforts to correct issues arising from its use of resources in these underprivileged communities. Its SCPPI was adjusted to reflect published shortfalls in sustainable project planning processes during the initial project definition stages.
- Example 3: Company Z reported responses to pharmaceutical related companies as Not Applicable (NA). The survey algorithm defaulted to

5 when computing NA. This would have been correct if the company actually had no pharmaceutical operations. However, Company Z did have a pharmaceutical business unit but the particular respondent was not aware of the practices within that unit. This over inflated the score of the company. Therefore, the responses were adjusted after consulting with the company's published information regarding its pharmaceutical business unit.

# Chapter 5: Data Collection and Analysis

In the previous chapter, the research methodology was explained and the effort leading to the indices and the survey development was presented. Moreover, the respondent identification process and data collection techniques were discussed. In the following chapter, the research premise will be reviewed and research findings stemming from the data analysis will be shared.

## 5.1 Research Premise review

This objective of this research study was to lay the foundation for examining the relationship between corporate commitment to sustainability and capital project planning and performance. The premise behind this research was that the relationship between commitment to the three pillars of sustainability and capital projects performance should hold if that commitment filters down from the top of the multinational corporation to the project planning level. Prudent, ethical planning of projects should help them be executed as planned, on time, on budget and more safely. Furthermore, extensive research has linked better project planning to risk reduction. Although our examination was restricted by the sample size, it helped shed light on the potential of statistical analysis that can be performed using this survey format, when more data is obtained. In the following chapter, the data analysis results will be presented. The relationship between the two indices (CSCI and SCPPI) will be observed in addition to the correlation between each index and cost and schedule performance.

## 5.2 Dependent and Independent Variables

Simple correlation analysis was used to examine relationships between the dependent and independent variables. The correlation coefficient was used to examine

the relationship between sets of two variables. Due to the sample size limitations, the objective of such statistical analysis was not to establish a statistical model but to use statistical techniques to investigate the presence of potential relationships between the variables. Both linear and non-linear relationships were tested and the analysis with the best correlation values was adopted. Correlations are only shown for samples of 8 data points and higher, to conform with general rules of thumb established by the Construction Industry Institute (CII) benchmarking and metrics program. Nevertheless, it is important to bear in mind that the correlations here are not statistically significant and are primarily used to show the potential of the data collection tool.

Only two variables were considered in each correlation assessment since the objective of this investigation is not to determine the integrative relationships between all the factors. Moreover, the limitation imposed by the total number of data points rendered multivariate analysis ineffective. The CSCI score was deemed the independent variable in the first three correlation cases. SCPPI, cost deviation, and schedule deviation were the dependant variables. In the later two cases, SCPPI was set as the independent variable and its correlation to cost deviation, and then schedule deviation was examined. Both indices and cost and schedule deviation were calculated from the inputs gathered from the questionnaire explained in Chapter 4.

### 5.3 ANALYSIS CAVEATS

It has to be noted, however, that there are several caveats to this research analysis. First of all, there is an inherent margin of error in the reported data. This error may be introduced by either the respondents' personal bias or by "cherry-picking" the large projects to be included in the sample. To remove such bias from the data and offset the effect of cherry picking, many steps were taken to validate the responses.

These steps included detailed referral to corporate financial reports and corporate documentation on sustainable development and corporate social responsibility. Moreover, answers were vetted for consistency. If any discrepancy in responses to related questions was observed, the applicable questions or sections were re-examined. For instance, if a high response for one question or set of questions should ostensibly lead to a high response in another set of questions and that high response was not noted. The results of the adjustments were discussed with respondents to obtain feedback.

More validation for the premise of the hypothesis was also obtained from the data collected on SCPPI (the degree of integration of sustainability practices in project planning). This data showed that the level of commitment to sustainability at the top of the corporation did filter down to the project level and hence ascertains the existence of an indirect between CSCI and cost performance.

### 5.4 THE DATA SAMPLE

Initially 38 corporations (82 percent owner and 18 percent contractor) were contacted for feedback. Of the 20 respondents to this research, 17 were owners, and three were contractors. In keeping with observed benchmarking tradition, the data analysis only included 17 multinational owner corporations that were pooled from the fortune 100 industrial, petrochemical, pharmaceutical and consumer product companies. Contractor data was noted on the graphs with different symbols, but was not included in the simple correlation attempt.

Primarily, both owner and contractor data was requested to establish the nuclei for a comprehensive future database and keep research opportunities open. In the future, if enough data is obtained from both owners and contractors, further comparative

studies could be performed to assess the difference in practices between owner run projects and contractor run projects.

It is apparent that there were a few exceptional top contractors driving sustainable behavior in Design-Build or Turnkey projects. In addition, many owners downsized and outsourced most of the detailed duties of project planning, engineering, procurement, and construction over the past 15 years. Therefore, large alliance contractors are typically the real executors in large industrial projects and hence in charge of sustainable practices including safety and environmental performance. However, sustainable development planning remains chiefly an owner forté and owner commitment continues to be the driving force behind sustainable behavior in the execution of capital projects.

The sample was chosen based on the degree of relevance of the corporation to the research; i.e. the size of the corporation, and the locations and extent of its international operations and contact with vulnerable indigenous communities. The choice of the corporation was also based on the existence of a sizeable sustainable development or corporate social responsibility unit that can provide relevant feedback and would have access to sample projects. This analysis was, therefore, performed only on the owner data sample of 17 responses. Relatively thorough responses for CSCI and SCPPI were available for all owner companies. However, only nine of the seventeen provided data for completed capital projects. The cost of the sample projects provided ranged from $200M to $5B. No data was received for design changes and only four corporations responded to the safety questions. Please refer to Figure 5.1 for the distribution of owner corporations' specialty and to Tables 5.1 and 5.2 for dataset descriptive statistics.

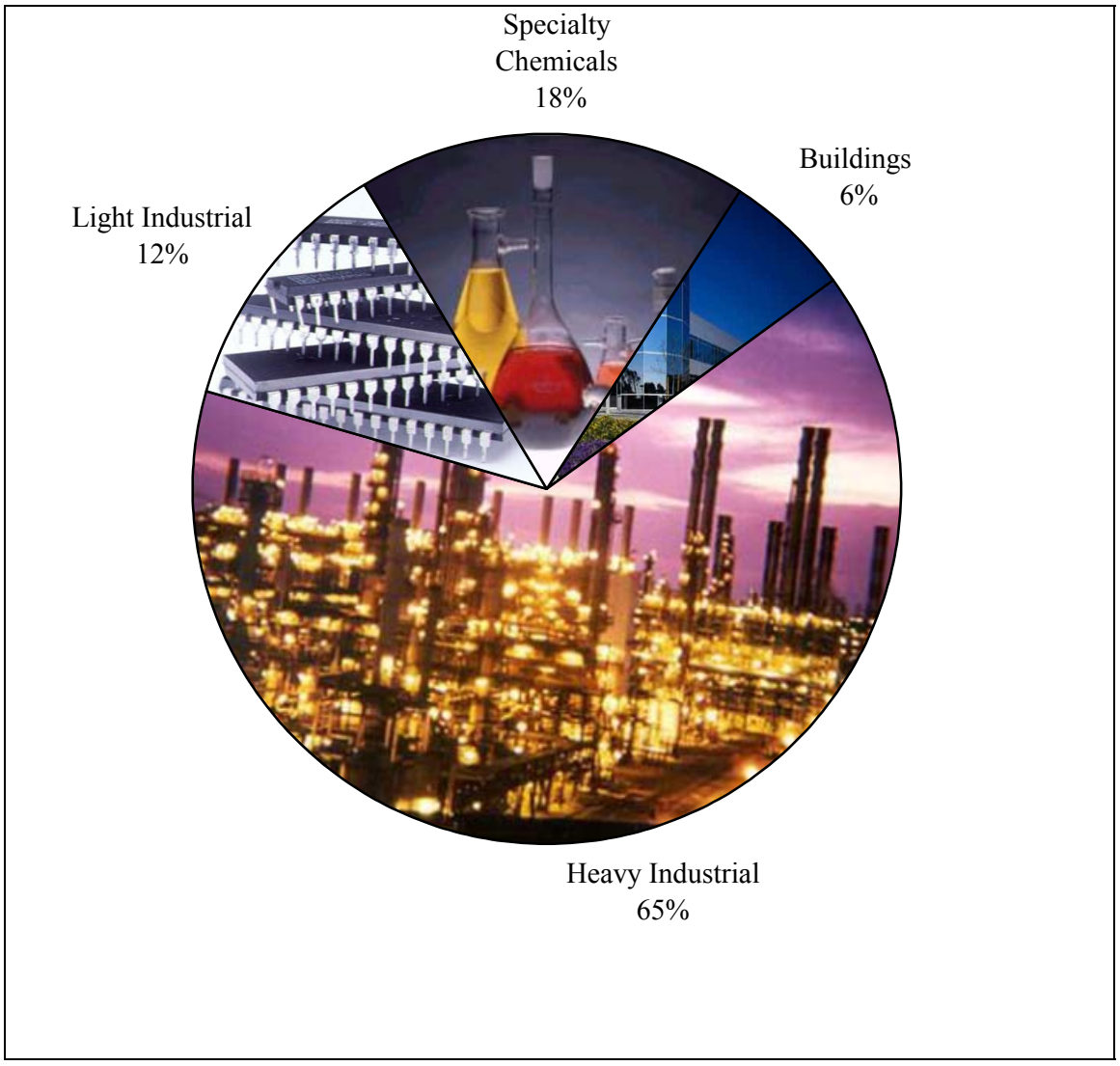



Figure 5.1: Data sample Characteristics- Owner Specialty

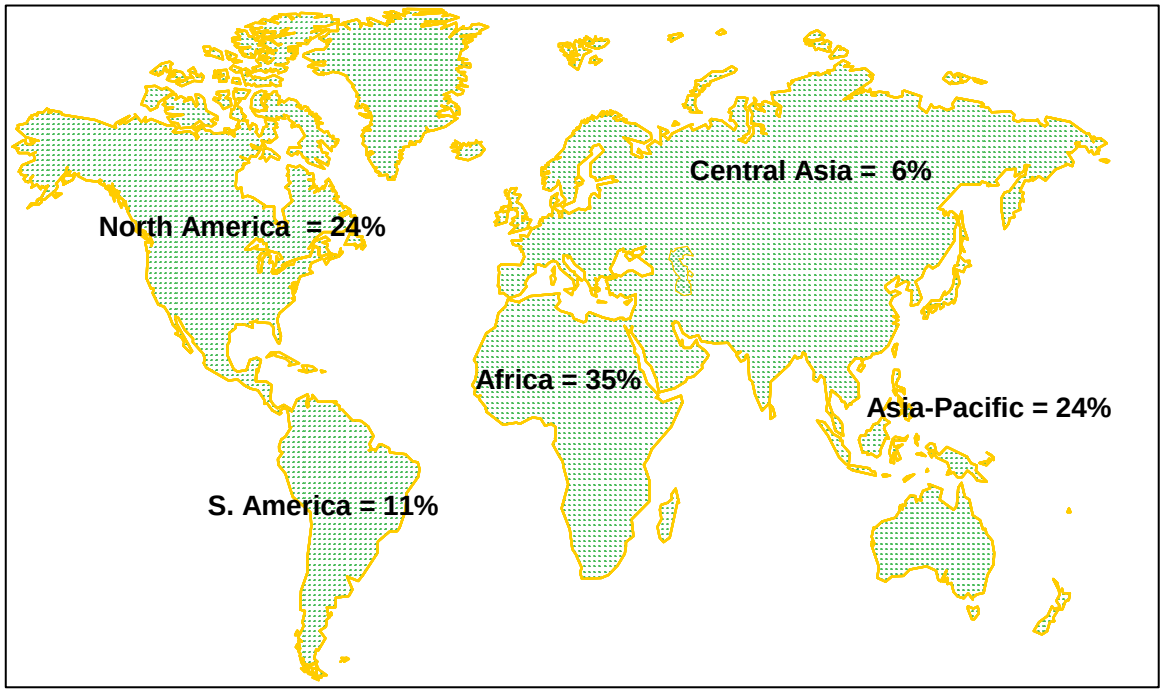



Figure 5.2: Data Sample Characteristics-Project Location

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| **CSCI** | 17 | 5.42 | 9.56 | 7.58 | 1.17 |
| **SCPPI** | 17 | 5.50 | 8.79 | 7.51 | 1.09 |
| **Cost Deviation** | 9 | -10.90 | 4.90 | -0.52 | 4.50 |
| **Schedule Deviation** | 8 | 0.00 | 33.33 | 9.98 | 13.47 |

Table 5.1: Complete Data Set Descriptive Statistics

### 5.5 HYPOTHESIS TESTING

Five sub-hypotheses were tested to support the main premise of this research. These were:

1. The level of owner commitment to sustainable practices (CSCI) should affect the level of owner economic, environmental and social planning and definition of large projects, as measured by the Sustainability Component of Pre Project Planning Index (SCPPI)
2. The level of owner commitment to sustainable practices (CSCI) should influence project cost performance.
3. The level of owner commitment to sustainable practices (CSCI) should influence project schedule performance.
4. The degree of integration of sustainable practices in project planning (SCPPI) should influence project cost performance.

5. The degree of integration of sustainable practices in project planning (SCPPI) should influence project schedule performance.

Although correlation does not necessarily mean causation, statistics can reflect trends in relationships between dependant and independent variables. Empirical indices and quantified relationships help illustrate points much faster than paragraphs of written words, especially in the engineering and science fields. Therefore, hypothesis testing is the study of the likelihood of the hypothesis merit, a mere examination of the relationships taking into consideration that the sample is not the whole population. Due to the low number of data points in this research, it would be meaningless to analyze exact relationships between the factors. Thus, the analysis is only aimed at examining relationships so that future research can more specifically improve on the current research findings. Despite the small sample size, however, all the common statistical analysis steps were followed in examining the relationships.

Mindful of that, one should look at statistical indicators as trend indicators. The correlation between two variables reflects the degree to which the variables are related or the degree of relationship, between the two variables. The most used measure of correlation is the Pearson Product Moment Correlation (Pearson's correlation). The Population Pearson coefficient of correlation is often referred to as rho (ρ). The Sample R, is simply "r" and is called Pearson's r. Pearson's r ranges from +1 to -1. A correlation of +1 means that there is a perfect positive relationship between 2 variables, where an increase in the independent variable marks an increase in the dependant variable. On the other hand, a Pearson's r of -1 indicates a perfect negative relationship between 2 variables. Moreover $R^2$ is the proportion of variance in y that is explained by regressing y on x and should be tested to see if the regression explains a significant proportion of

the variance, i.e. the slope of the line = 0 ( $H_o$: b = 0 vis-à-vis $H_i$: b $\neq$ 0). $R^2$ is used to render the relationship unitless.

In a situation where sample size is statistically significant and hypothesis acceptance or rejection is being determined, the P-value for the hypothesis is typically set at 0.1 or 0.05. P-value measures the significance of the difference between two populations/samples. An insignificant difference indicates that little or no relationship exists between the populations/samples' means while a significant difference indicate some sort of relationship exists. In other words, the P-value is the probability of our assumptions being incorrect. Hence, the lower the P-value, the sounder the analysis. The combination effects of $R^2$ and P-value is typically used to determine the usefulness of the measured relationships.

Correlation coefficients allow us to test the strength of a relationship, while regression analyses allow us to formally describe any such relationship. Regression involves finding a trend (line) that best describes the relationship in bivariate data and can be used to predict the relationship between x and y. This might be a further application of the research (beyond this dissertation) once more data points are collected to allow modeling and use of this research data as a predictive tool. If a company can measure their CSCI, or their SCPPI scores, they can look at a regression model or line and be able to roughly estimate where their project performance should lie. In a regression y = a+bx, b = the slope of line, a = the intercept of line on y where x = 0. Most importantly, least squares regression assumes normality of the data. Q-Q plots were used to ascertain the normality of this data.

Furthermore, the true value of $R^2$ was assessed using a mathematical adjustment to $R^2$ known as validity shrinkage. Smaller sample sizes tend to bias

regression results. In this research N=17 data points. The value of $R^2$ in a smaller sample is generally biased (overestimated) compared to the population $R^2$ and should be unbiased or adjusted. The smaller the sample size the bigger the adjustment to $R^2$ based on the validity shrinkage formulae $R^2$ pop = 1-( ( n-1)/(n-p-1))(1-R2). Please refer to Table 5.3.

| | **Correlation 1** | **Correlation 2** | **Correlation 3** | **Correlation 4** | **Correlation 5** |
|---|---|---|---|---|---|
| **N** | 17 | 9 | 8 | 9 | 8 |
| **Independent Variable** | CSCI | CSCI | SCPPI | CSCI | SCPPI |
| **Dependent variable** | SCPPI | Cost Deviation | Cost Deviation | Schedule Deviation | Schedule Deviation |
| **R Squared** | 0.71 | 0.45 | 0.51 | 0.89 | 0.92 |
| **Adjusted R Squared** | 0.69 | 0.27 | 0.35 | 0.84 | 0.89 |
| **T** | 6.08 | -2.2 | -2.33 | -2.6 | -3.74 |
| **Significant T[1]** | 0.00 | 0.07 | 0.06 | 0.04 | 0.01 |
| **F** | 37.00 | 2.00 | 1.69 | 19.64 | 28.7 |
| **Significant F** | 0.00 | 0.21 | 0.26 | 0.004 | 0.00 |
| **Curve Estimation [2]** | Linear | **Model: {$y= a + bx+ cx^2 + dx^3$}** | | | |
| **Please Refer to** | Figure 5.3 | Figure 5.4 | Figure 5.5 | Figure 5.6 | Figure 5.7 |

Table 5.2: Data Analysis Summary

[1] **P-value was set to 0.05 , model parameters for Schedule deviation analysis could be acceptable if data were sufficient**

[2] **However, a valid statistically significant model can not be developed with N = 8 and low $R^2$, therefore this is only an illustration of the potential data trends**

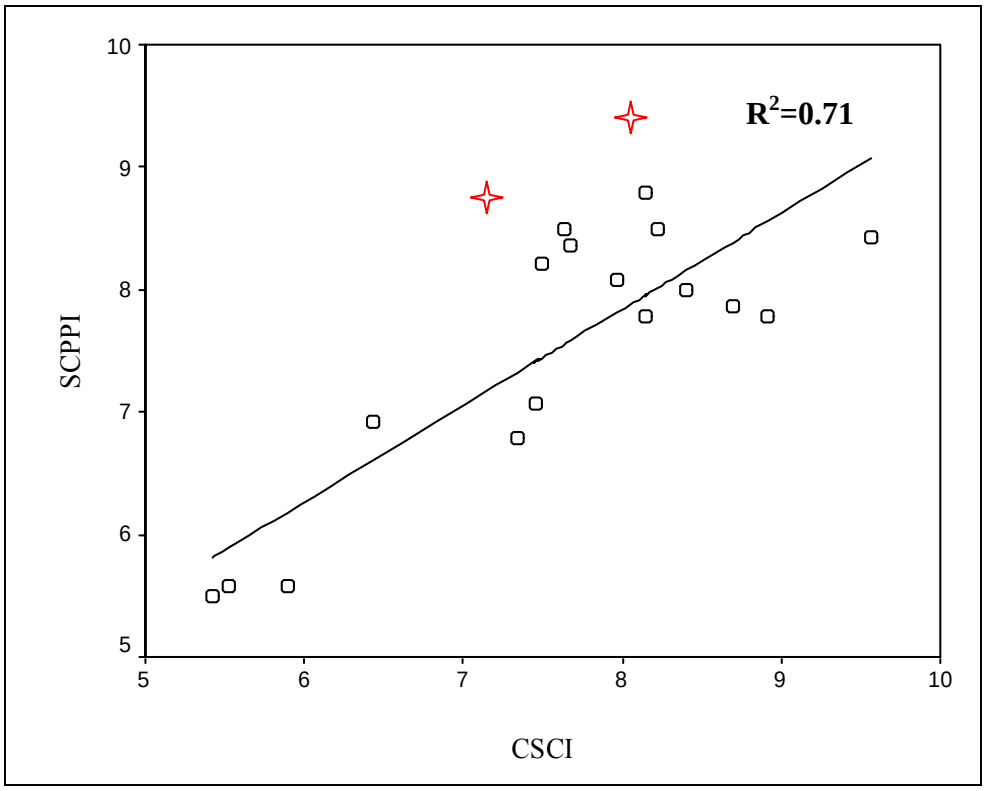



Figure 5.3: The Relationship Between CSCI and SCPPI.[3]

As explained in Chapter 4, CSCI and SCPPI are related surveys. The former quantifies the commitment to sustainability at the top of an organization, while the later measures the integration of sustainability practices in project planning and definition. For instance, when the CSCI survey questions the level of environmental awareness at the top of the organization, SCPPI questions the degree of planning that went into studying environmental regulations at the location of the project prior to setting a baseline budget and schedule that is presented to management for commitment of funds. Figure 5.2 illustrates the correlation between CSCI and SCPPI. The data appears to

[3] Although not included in the analysis, the 2 available contractor data points are shown in Fig 5.3 for illustrative purposes only and represented by a star symbol ( ✧ ).

demonstrate a linear relationship between the two indices at an $R^2$ of 0.71, an adjusted $R^2$ of 0.69, and a T of 6.08 with a significance level or P-value of 0.00 %. Please refer to Table 5.3. $R^2$ explains the percent of change in y that can be explained by the change in x. In this case, 70 percent of the variation in SCPPI can be explained by the variation in CSCI.

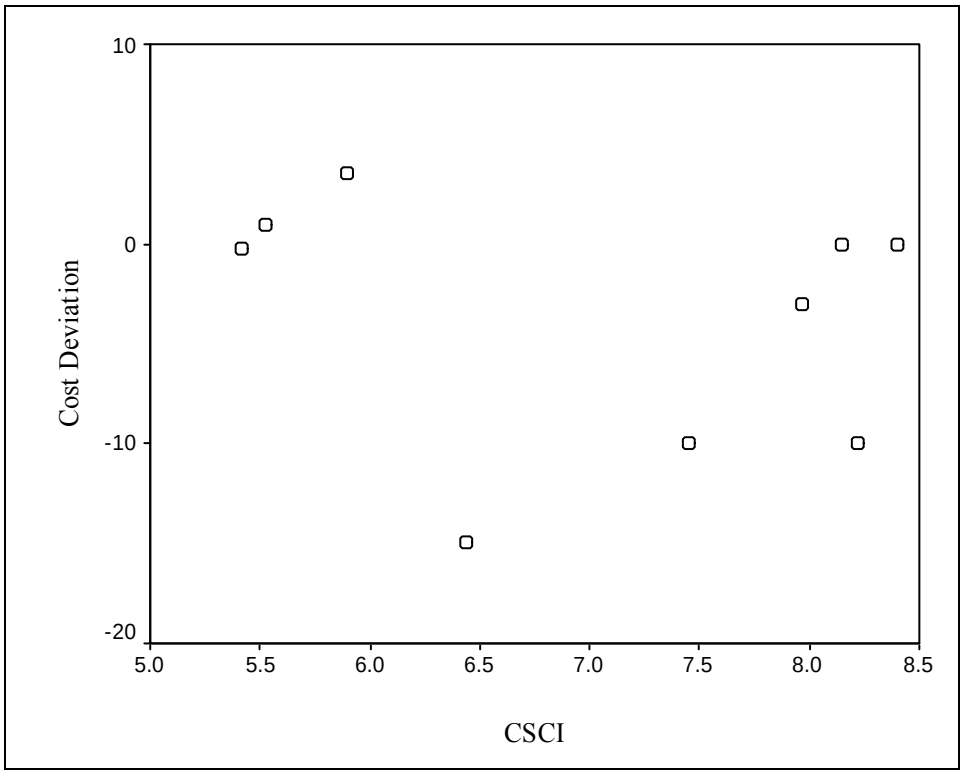



Figure 5.4: The Relationship Between CSCI and Cost Deviation

In Figure 5.3, The $R^2$ for this particular relationship was 0.45 and the adjusted $R^2$ is 0.27. Please note that this is not intended to be a statistical model fit. It is merely an illustration of the potential relationship between the two variables. The data shows

the likely tendency to curve down with higher Commitment indicating the existence of a trend albeit statistically insignificant at a significant T of 0.07.

It can be reasoned that the relationship between CSCI and SCPPI should naturally be linear because the more genuine the commitment the corporation has to sustainable development the more this should be reflected in its planning of large and mega projects. One expects this relationship to continue being linear indefinitely. On the other hand, the relationship between commitment and cost and schedule performance would follow a more curved pattern. I.e. Cost and schedule predictability would naturally peak at an optimal (*Best Practical*) level of commitment and then taper off. This also applies to the level of sustainable planning (SCPPI) and project performance. More planning produces better results up to an optimal point, after which more planning would not necessarily result in better results

Figures 5.3, 5.4, 5.5 and 5.6, on the other hand, examine a seemingly diminishing marginal utility rate (curved) relationship between CSCI and SCPPI in turn and project performance. Higher commitment produces better results to an optimal level or best practical level and then the rate of influence slows down or plateaus. Albeit more pragmatic than ethically defensible, it appears that there maybe such a thing as over commitment to sustainability, because over commitment might not result in significantly different changes to the bottom line. Moreover, over commitment might actually result in costs creeping back up. The same notion applies to the relationship between SCPPI and cost and schedule performances

From looking at the data, it is possible that the law of diminishing marginal returns and W.S. Jevons theory of diminishing marginal utility of wealth is at play. Simplistically speaking, the theory states that the utility from acquiring $10 is not

necessarily double the utility of acquiring $5. This is typically the case in most real life investment efforts results. They peak at an optimal level and then the rate of change due to the influence of the investment starts to flatten. It appears from the data that, similar to project definition, commitment to sustainability and to appeasing local communities, does actually have a best practical level, after which the effects on capital performance start to taper off. In other words, the better the CSCI or SCPPI the more effects we expect to see in terms of lower funds spent from the budget, up to a certain optimal or *Best Practical* point, after which more commitment will not necessarily result in equal margins of reduction in budget use. Moreover, over planning may ultimately lead to spending more funds from the budget as resources are over invested in an effort to "gold plate".

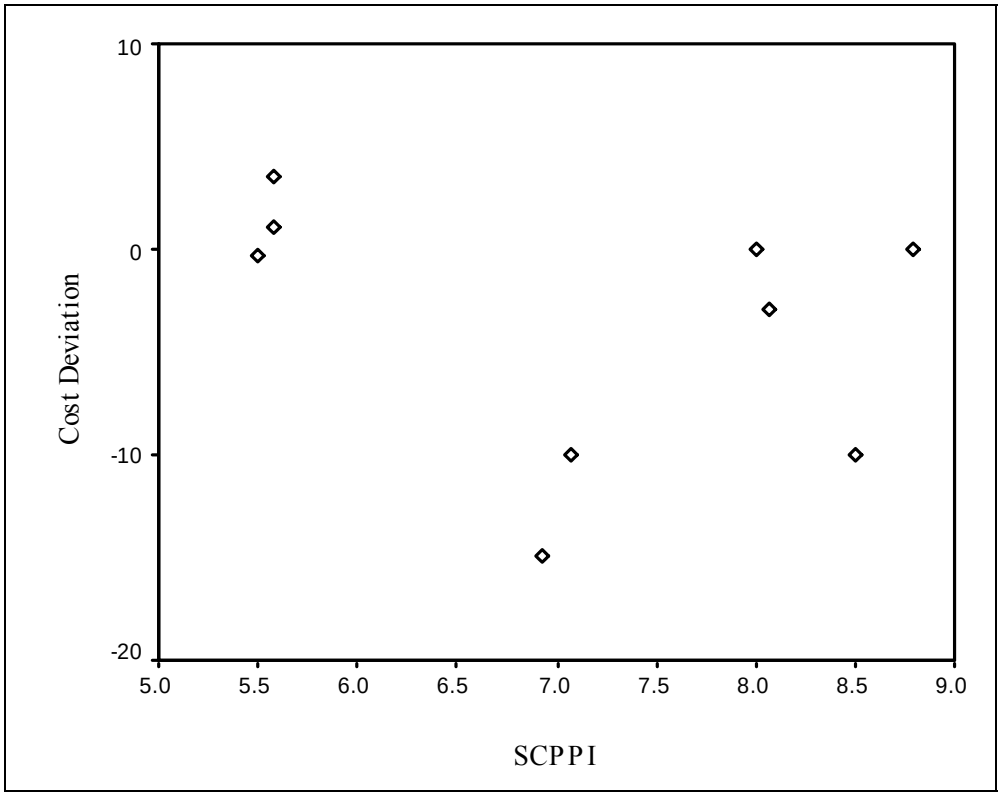



Figure 5.5: The relationship Between SCPPI and Cost Deviation

The examination of the data from SCPPI and Cost deviation also show a potential trend but no statistically significant results at an $R^2$ of 0.51, an adjusted $R^2$ of 0.35 and a significance level of 0.06. Please note that is not intended to be statistical model fit. It is merely an illustration of the potential relationship between the two variables. Table 5.3 also shows that cost deviation data has shown far lower $R^2$ and T values when tested against CSCI and SCPPI than schedule deviation data. One of the main reasons for this difference is the nature of the cost data compared to the schedule data.

Collecting accurate cost data in corporations is more challenging than schedule data. Accounting intricacies and coding differences between project budgets and corporate accounts IT tools like SAP require a good deal of skill to ascertain that project budgets are not taxed with heavy overheads or general administration costs that do not belong specifically to the named project. Sadly, many project managers are not equipped to handle this challenge. Moreover, many organizations have punitive cultures that frown upon exceeding project budgets and strongly encourage coming under budget. Although seemingly financially prudent, this punitive culture tends to prompt project managers to inflate or pad their estimates to ascertain coming on or lower than budgeted.

Estimate padding can be very harmful for corporations for many reasons. When the Authorization for Execution (AFE) document is handed to top management, it represents the project team or project unit's commitment to certain cost and schedule deliverables. Top management on the other hand, by signing on a project, commits to making the designated amount of funds available to the team for the duration of the project. Inflating estimates engages funds that could be otherwise invested in different

assets to enhance the productivity or competitiveness in the organization. Moreover, excess project money left on the table tends to be money spent on items that could be beyond the original project scope. Therefore, accurate data might not be collected about the true costs of projects for future financial planning. All of the above-mentioned reasons make cost deviation a thorny parameter to measure.

Schedule deviation, on the other hand, is less problematic to record and collect. Tracking the difference between the estimated and actual project duration is less challenging than cost. Furthermore, corporations do not intrinsically make the connection between longer schedules and more spending, so they are more prone to openly share that information. However, projects that are longer than necessary also tend to be more expensive than necessary. Time is money, especially when resources continue to charge expensive engineering and labor time on open project budgets. Therefore, the strength of the relationship between the indices and schedule deviation further support the existence of a relationship between the indices and cost deviation, albeit not statistically as visible.

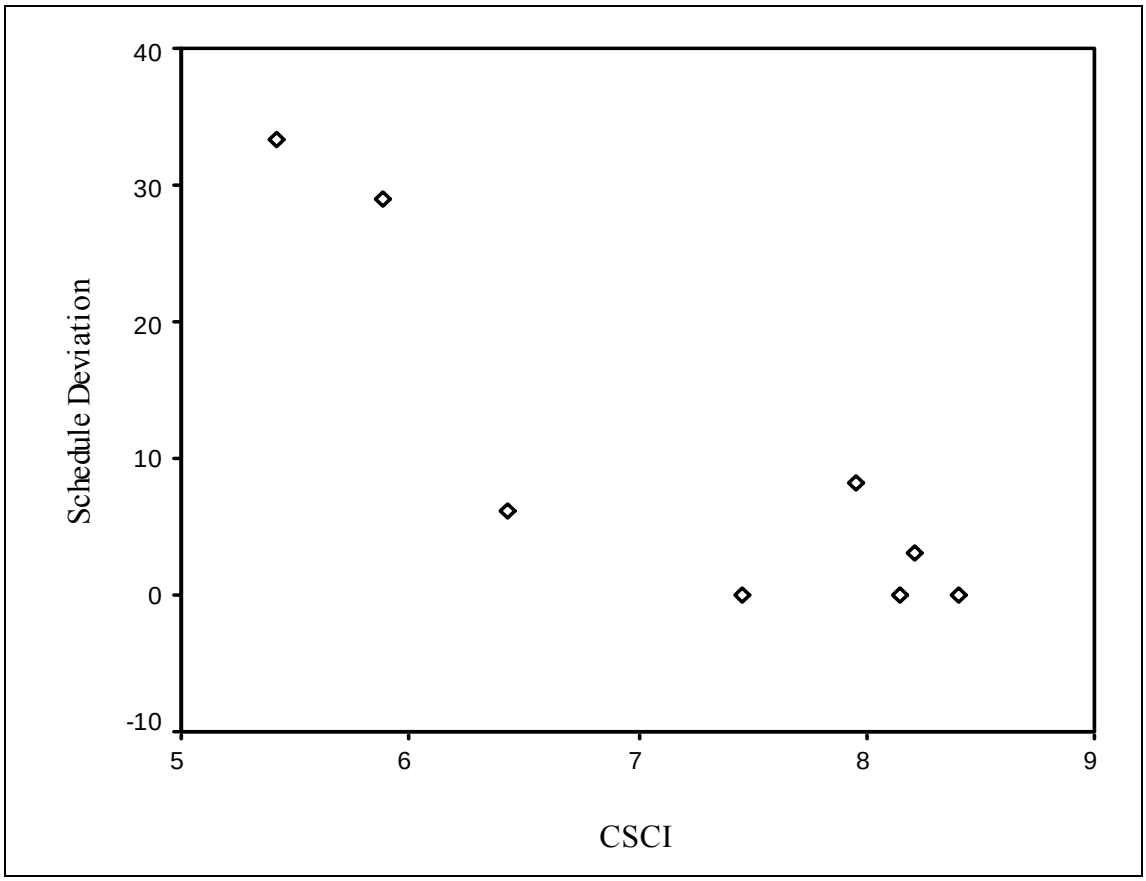



Figure 5.6: The Relationship Between CSCI and Schedule Deviation

Since time is not viewed as key as cost in many organizations, there tends to be a more accurate picture reflected internally and externally. Figure 5.5 illustrates that potential relationship between CSCI and schedule deviation. Please note that this is not intended as a statistical model fit. It is merely an illustration of the potential relationship between the two variables. The $R^2$ here is 0.89, the adjusted $R^2$ is 0.84, at a significance level of 0.01. I.e. close to 90 percent of the change in schedule deviation can be interpreted by the level of corporate commitment to sustainability. This notion is further demonstrated by the relationship between SCPPI and schedule deviation. The $R^2$ of the

relationship between SCPPI and schedule deviation is 0.92 and the adjusted $R^2$ is 0.89 at a significance level of 0.01. Please refer to Figure 5.6.

The inherent impact of longer durations on budget spending and the stronger relationship observed in this dataset between CSCI and SCPPI and schedule deviation further ascertains that there is a relationship between both indices and cost deviation. It could not be seen more clearly in the cost data because of higher error margins in the cost information.

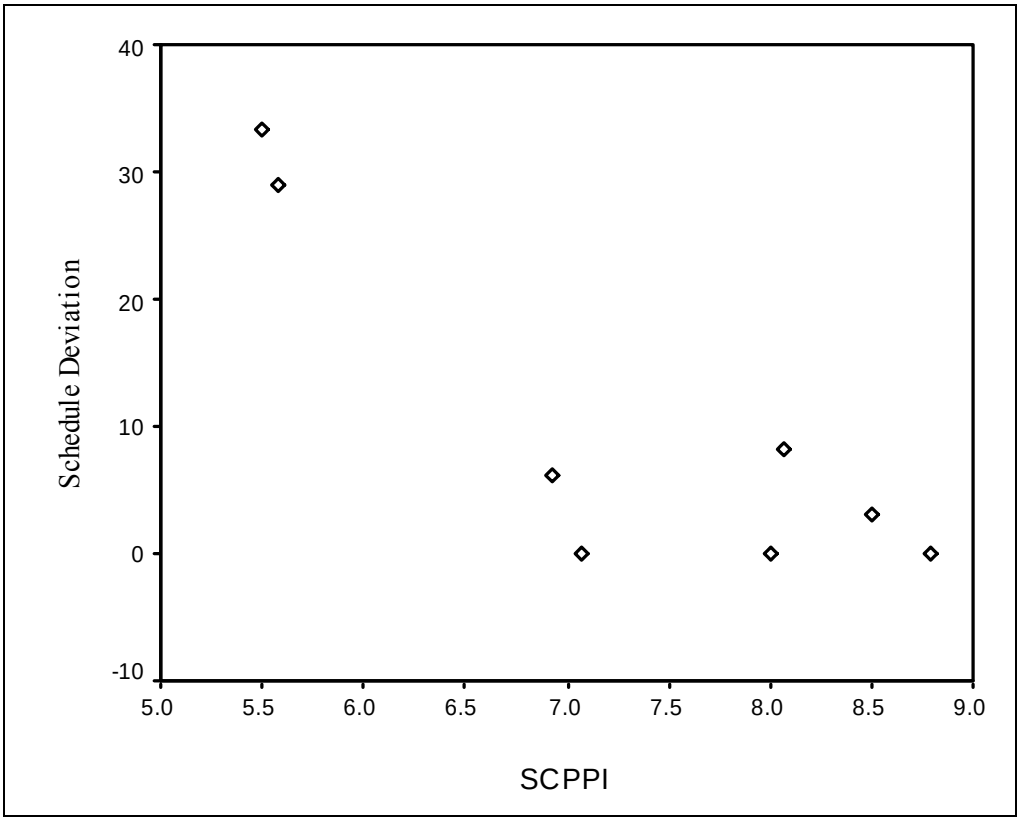



Figure 5.7: The Relationship Between SCPPI and Schedule Deviation

## 5.6 DESIGN CHANGES AND SAFETY

Data received for both design changes and safety performance was not sufficient to perform a meaningful analysis. However, one interesting point was noted in the safety data. The four companies that provided safety data had relatively high scores on CSCI and SCPPI (above 7.0) and all four companies reported no Recordables, DARTs or near misses. Although the sample is too small to establish any statistical relationship, it appeared from the data that companies with higher commitment to sustainable practices and higher integration of sustainable practices in project planning, tend to fare well in safety performance.

## 5.7 ANALYSIS CONCLUSIONS

First, it appears from the analysis that owner corporate commitment to sustainability tends to translate to project commitment by filtering down the organization to the capital project planning level. Corporations that are more aware of the three pillars of sustainability and more vocal about them tend to incorporate that consciousness into their large and mega project planning. Secondly, there are indications that commitment to sustainability at the higher levels of a multinational corporation can be measured by CSCI and more data may lead to more statistically significant relationships with project cost and schedule predictability. The two indices can be useful measures for both the governments of host countries and industrial multinationals.

# Chapter 6: Conclusions and Recommendations

## 6.1 Study Conclusions

The main objective of this study was to lay the basis for a research mechanism to help examine the impact of owner corporate commitment to sustainability on capital project planning and performance. The research methodology involved the formation of five sub objectives to support the main objective. The five sub-objectives of the study were to develop a Corporate Sustainability Commitment Index (CSCI) that enfolds the three pillars of sustainability (economic, social, and environmental), to develop a Sustainability Component of Project Planning Index (SCPPI), to examine the relationship between CSCI and SCPPI, to examine the relationship between CSCI and project performance, and to examine the relationship between SCPPI and project performance. To collect data on the aforementioned indices a survey tool had to be created. The survey also collected data on capital project performance.

The basic research hypothesis was that a balanced corporate commitment to the three pillars of sustainability should improve capital project planning and ultimately enhance capital project performance. Corporations that are more aware of and more committed to the three pillars of sustainability (ethical financial practices, social responsibility, and environmental prudence) have relatively better capital project performance in terms of cost and schedule predictability. This is generally the case when sustainability commitment at the top levels in the organization filters down to the capital project planning level. Sustainable practices address capital projects risk factors,

including stakeholders' buy in, local community acceptance, safety of operations and labor satisfaction. If these factors are not planned for properly during project planning and definition, they can negatively influence project performance by delaying projects and consuming contingency on unforeseen obstacles. These risk factors also tend to disrupt site operations because of the high occurrence of injury incidents, reduced labor productivity, local community disturbances, and environmental permits delay.

The following three conclusions were drawn from this research effort.

1. It appears that corporate commitment to sustainability at the executive level is translating to better planning for sustainable project practices at the project definition level.
2. There are general indications that the commitment to sustainability at the higher levels of multinational corporations can be measured by CSCI and more data should lead to establishing more statistically significant relationships with project cost and schedule predictability.
3. Thirdly, the two metrics that were created in the study (CSCI and SCPPI) appear to be useful sustainability measurement tools. Index results were approximately normally distributed, with the expected positive skewness, characteristic of self-reported survey results.

## 6.2 RESEARCH CONTRIBUTIONS

This research provided several contributions to the body of knowledge:

- Developed a quantitative index for owner commitment to sustainable construction (CSCI)
- Developed a quantitative index for the integration of sustainable practices in the project planning of large industrial projects (SCPPI)

- Examined the relationship between owner commitment and capital project planning
- Contributed to laying the basis for more research about the business case for sustainability. Raising awareness about the business case for sustainability helps popularize the concept as both ethical and pragmatic.

### 6.3 RECOMMENDATIONS FOR FURTHER ACADEMIC RESEARCH

- Further develop the database and conduct more detailed factor analysis
- Tailor the index to different locales, different scale projects, and different industrial applications.
- Collect more data on absolute cost performance in capital projects and examine the impact of corporate commitment to sustainability on actual cost savings.

### 6.4 RECOMMENDATIONS FOR INDUSTRY IMPLEMENTATION

Two main recommendations for industry implementation can be drawn from this research study:

- *Measure, benchmark, and re-measure sustainability commitment at the executive level of industrial corporations.* There are indications that better commitment enhances the competitive advantage of the organization.
- *Ensure that top management commitment to sustainability is reflected on planning capital industrial projects.* There are indications that the higher the level of integration of sustainable practices in the project planning level, the less likely the project will face risks during execution. Hence, projects and programs should be more successful in meeting baseline cost and schedule.

# Appendix A: Detailed Survey Format

## CORPORATE COMMITMENT TO THE THREE PILLARS OF SUSTAINABILITY QUESTIONNAIRE

**General Corporate Information**

Company Name: _____
Head Quarters Location: _____
Major Industry Type
☐Oil and Petrochemical
☐Pulp and Paper
☐Automotive Assembly
☐Consumer Products
☐Microelectronics Manufacturing
☐Pharmaceutical Manufacturing
Number of Operating Segments:
Local: _____
International: _____
Number of Business Units: _____
Annual Sales: _____
Number of Employees
Home Country: _____
Worldwide: _____
Contact Person: _____
Function: _____
Contact's Phone: _____
Contact's Fax: _____
Contact's E-mail Address: _____

**Sustainability / (CSR) Corporate Social Responsibility Unit**

Location: _____
Number of Employees: _____
Title of Unit Lead: _____
Number of Projects Handled by Unit Annually: _____
Number of Projects Handled by Each Member of the Unit: _____
Does your company have strategically targeted sustainability Policy?
Yes __ No__
If yes, please rank the following areas in terms of strategic importance within your corporate policy: 1-6 (with 1 being most important)
☐ Maintaining current Business operations and creating future business opportunities
☐ Improving access to financial capital
☐Attracting and retaining talent
☐Encouraging technological innovation
☐Reducing the Ecological footprint
☐Giving back to the community

Does your company benchmark/measure/ audit its sustainability performance?
Yes __ No__
Does Unit issue an annual sustainability report?
Yes ___ No___
If Yes, Please attach one to this questionnaire.
Is your corporation a member of BSR (Business for Social Responsibility)?
Yes ___ No___
Is there a sustainability representative of project teams? Yes___No___

**Capital Project Data**

Project ID: _____
Please provide the Name that you will use to refer to this Project:
_____
Project Location: Domestic (US States or Canadian Territories) _____
Project Location: International (Country) _____
Contact Person: (Name of knowledgeable person) _____
Contact's Phone: _____
Contact's Fax: _____
Contact's E-mail Address: _____

**CORPORATE SUSTAINABILITY COMMITMENT INDEX**
The Economic Pillar
Corporate Organization and Strategic sustainability Planning

Is CSR/ Sustainable Development the official responsibility of the board of directors?
☐Yes
☐Yes, with the involvement of the Chief Executive Officer
☐No
☐Don't Know
☐N/A, Please Explain _____

How many members are on the board of directors?
☐ More than 10
☐ 5-10 members
☐Less than 5 members
☐Don't Know
☐N/A, Please Explain _____

Does the board of directors include corporate executives?
☐ Several
☐ Few

☐One
☐Don't Know
☐N/A, Please Explain _____

Please indicate the make up of your board by nationality
☐A Diverse Group, not dominated by one nationality
☐Some Diversity, representing countries of operation
☐Dominated by one nationality
☐Don't Know
☐N/A, Please Explain _____

Does the board of directors include employee or union representatives?
☐Yes, it is the corporate policy
☐Yes, it is required by law
☐No
☐Don't Know
☐N/A, Please Explain _____

Is risk management the official responsibility of the board of directors?
☐Yes
☐Yes, with the involvement of the Chief Executive Officer
☐No
☐Don't Know
☐N/A, Please Explain _____

To what degree is the connection between risk management and Sustainable operation made at the corporate level?
☐Often
☐Rarely
☐Not at all
☐Don't Know
☐N/A, Please Explain _____

In the case of crisis situations, that can damage the reputation of the corporation, who is responsible for damage control?
☐The Board of Directors
☐The Board, with the involvement of the Chief Executive Officer
☐No clear single point responsibility
☐Don't Know
☐N/A, Please Explain _____

Is there a clear documented policy for the required damage control actions and the chain of responsibility for failure to manage damaging crisis situations?

☐Yes, very clear
☐Yes, an unwritten traditional policy
☐No
☐Don't Know
☐N/A, Please Explain _____

In the case of a very image damaging crisis situation, what sort of reaction would you expect to see in your corporation?
☐Mass Resignations
☐Some resignations
☐No change
☐Don't Know
☐N/A, Please Explain _____

Sustainability and Investor Relations
Do you conduct training sessions to educate corporate financial analysts and corporate investors about sustainability issues and their weight on your corporate bottom line?
☐Yes
☐Yes, only analysts or investors but not both
☐No
☐Don't Know
☐N/A, Please Explain _____

If Yes, How often?
☐ Monthly
☐Quarterly
☐Annually
☐Never
☐Don't Know

Do you conduct (IPSs) Investor Perception Studies?
☐Yes
☐ Yes, We Conduct Other Similar Studies, Namely _____
☐No
☐Don't Know
☐N/A, Please Explain _____

If Yes, How often?
☐ Monthly
☐Quarterly
☐Annually
☐Never
☐Don't Know

To what degree are the results of perception studies disseminated within the corporation?
☐ To All Levels of the Corporation
☐ To The Board of Directors and the Chief Executive, Operating and Financial Officers and Some Levels of Middle Management
☐ To The Board of Directors and the Chief Executive, Operating and Financial Officers Only
☐To The Board of Directors Only
☐The Results Are Kept Within the Sustainability /CSR Unit

Does your company offer an employee stock options program?
☐Yes
☐ Yes, we offer similar incentive programs, namely _____
☐No
☐Don't know
☐N/A, Please explain _____

If yes, is the current value of stock options disclosed in financial reports and statements?
☐Yes, and the company books the current value of its employees stock options as corporate expense
☐ Yes, but it is not booked as a corporate expense
☐No
☐Don't Know
☐N/A, Please Explain _____

Does your corporation employ independent financial auditors?
☐ Always
☐Sometimes
☐No
☐Don't Know
☐N/A, Please Explain _____

To what degree are corporate financial records and audit results transparent and available to employees and investors?
☐Very Transparent
☐Somewhat Transparent
☐Not Transparent
☐Don't Know
☐N/A, Please Explain _____

Do the corporation's independent financial auditors serve the company in any other facility?
☐No
☐The auditors are involved minimally in some other dealings with the corporation
☐Yes, the auditors are involved in many other capacities in the corporation
☐Don't Know
☐N/A, Please Explain _____

Benchmarking Sustainability Initiatives
Who is formally responsible for benchmarking sustainability initiatives within your corporation?
☐An external Auditor/Consultant reporting to the director of sustainability and the board of directors
☐The sustainability director or unit
☐No one
☐Don't Know
☐N/A, Please Explain _____

What does the benchmarking process involve?
☐Measuring performance on the three pillars of sustainability
☐Focusing on one or two issues only
☐No documented process
☐Don't Know
☐N/A, Please Explain _____

Do you use any other benchmarking techniques within the organization to supplement your sustainability measurement?
☐Yes, several
☐Some
☐None
☐Don't Know
☐N/A, Please Explain _____

What other techniques do you use?
☐Project benchmarking, Peer Reviews, Balanced Score Cards…. Etc.
☐Some Internal performance measurement
☐None
☐Don't Know
☐N/A, Please Explain _____

Does your measurement system assess the degree of impact of sustainability issues on capital project performance?
☐Yes in most capital investment opportunities

☐Yes, only in larger, high visibility or international projects
☐No
☐Don't Know
☐N/A, Please Explain _____

How does your system evaluate the risks of sustainability issues on capital effectiveness?
☐Adopting the three bottom line approach
☐Looking at the effect of environmental friendliness on the single bottom line
☐Do not evaluate
☐Don't Know
☐N/A, Please Explain _____

Does your measurement system examine the degree of preparedness in handling reputation and credibility damaging crisis?
☐Yes, all aspects including PR, media relations strategy
☐Some aspects like business continuity
☐No, none
☐Don't Know
☐N/A, Please Explain _____

Does your measurement system involve personal visits to project sites?
☐Yes, frequent
☐Occasional, only to Mega projects
☐No visits
☐Don't Know
☐N/A, Please Explain _____

Does your measurement system assess starting, ongoing and completed projects?
☐Yes, we measure the awareness and dedication to the initiatives at all stages
☐Yes, only project that are beginning and face considerable local opposition
☐No specific criteria, any project
☐Don't Know
☐N/A, Please Explain _____

How often do you communicate the results of the benchmarking exercise to employees?
☐Very often
☐Infrequently
☐Hardly ever
☐Don't Know
☐N/A, Please Explain _____

Customer Satisfaction and creating brand Loyalty

Does your corporation place considerable empathies on its brand name?
☐Yes, very much so
☐Not explicitly
☐No
☐Don't Know
☐N/A, Please Explain _____

What is the estimated financial value of your most important brand name associated products?
☐ Very high, damage to brand name will affect overall company performance dramatically
☐Damage to one of our brand names will impact but not impair our performance
☐No estimated financial value
☐Don't Know
☐N/A, Please Explain _____

Does your corporation associate the value of your brand name(s) with the company's public image?
☐Often
☐Rarely
☐Not al all
☐Don't Know
☐N/A, Please Explain _____

Are corporate social responsibility/sustainable development viewed as a means to maintain brand name loyalty?
☐Often
☐Rarely
☐Not al all
☐Don't Know
☐N/A, Please Explain _____

Do you use Customer Quality Questionnaires to monitor customer satisfaction?
☐Often, and the results are disseminated internally and incorporated in future business plans
☐Rarely, only in extreme cases when customer issues are serious or potentially litigious
☐Not al all
☐Don't Know
☐N/A, Please Explain _____

Marketing Practices
Did your Corporation implement the IFPMA Code of Pharmaceutical Marketing Practices?

☐Yes, worldwide
☐We implemented another equivalent standard, namely _____
☐Not al all
☐Don't Know
☐N/A, Please Explain _____

How do you measure your IFPMA compliance?
☐ Developed metrics for measuring issues such as improving access to medicines in developing countries, implementing health-related education and prevention programs, or establishing global safety and ethical standards for the pharmaceutical industry
☐ Record the number and nature of regulatory complaints concerning your corporations marketing practices worldwide
☐ Do not measure IFPMA compliance
☐Don't Know
☐N/A, Please Explain _____

Does your corporation incorporate public health issues in its worldwide marketing plans?
☐Yes, often and worldwide
☐Sometimes, to a limited extent
☐Not al all
☐Don't Know
☐N/A, Please Explain _____

Does your organization use responsible political lobbying to shed light on important public health issues and influence policy on addressing public health emergencies?
☐Yes, often and worldwide
☐Sometimes, to a limited extent
☐Not al all
☐Don't Know
☐N/A, Please Explain _____

Does your corporation work with central governments to develop higher healthcare infrastructure and reduce the re-importation of differentially priced products?
☐Yes, often and worldwide
☐Sometimes, to a limited extent
☐Not at all
☐Don't Know
☐N/A, Please Explain _____

The Social Pillar
Ethics and Codes of Conduct

Does your corporation have a clearly defined code of ethical conduct for national and international operations?
☐Yes, for both national and international projects
☐Yes, only local
☐No clearly defined code, only honor system driven
☐Don't Know
☐N/A, Please Explain _____

What issues does the code of conduct specifically address?
☐Corruption and Bribery
☐Environmental, Health and Safety
☐Discrimination
☐Security of employees and operations
☐Discrimination
☐Sexual harassment
☐Whistelblowing

How does the corporation ensure compliance with the code of conduct?
☐ The code of conduct is stressed and employees are empowered to own the problems and to report crooked behavior without fear of retaliation
☐The code is sometimes referred to, but there is no clear process by which employees can address problems
☐The code is never referred to
☐ Don't Know
☐N/A, Please Explain _____

Does your company have a disclosure of political or charitable contributions policy?
☐Yes
☐Only political or charitable but not both
☐No Policy Exists
☐Don't Know
☐N/A, Please Explain _____

Does your policy cover all, contractors, alliance contractors, subcontractors, suppliers, subsidiaries and joint ventures?
☐ Always
☐Sometimes
☐Never
☐Don't Know
☐N/A, Please Explain _____

Identifying Stakeholders

Does your company have a formal procedure of identifying stake holders on a project or a financial venture?
☐Yes, a formal documented procedure
☐Yes, an informal exercise
☐No Policy Exists
☐Don't Know
☐N/A, Please Explain _____

Which groups are typically considered as stakeholders?
☐Local communities
☐Government Authorities
☐NGO's
☐Suppliers
☐Consumer Groups

Does your corporate policy require the performance of a Social Impact Assessment (SIA) or the preparation of a Social Impact Statement?
☐Yes, often and world wide
☐Seldom and only nationwide
☐Not Required
☐Don't know
☐N/A. Please Explain_____

Labor Practices
Do you have a clear policy following ILO's conventions :
☐Numbers 87, 98 (Freedom of association)
☐Number 100 (Equal Remuneration)
☐Number 111(Non Discrimination)
☐Guide to worker's displacement
☐Code of practices for a safe workplace

Is there a corporate policy to allow your employees to report violations without fear of retaliation?
☐Yes, a formal policy
☐Yes, an informal culture
☐No Policy Exists
☐Don't Know
☐N/A, Please Explain _____

How can employees report these violations, and how often have there been reports in the last 5 years? Please explain _____ _____
_____ _____ _____ _____

_____ _____ _____ _____ _____

Does your corporation endorse the ILO's Tripartite Declaration (Multinational Corporations and Social Policy)?
Yes___ No___

Does your corporation endorse OECD Guidelines for Multinational Corporations?
Yes___ No___

Does your corporation endorse the ground rules of Fair Trade Agreements?
☐Yes, nationally and worldwide
☐ Yes, only nationally
☐No
☐Don't Know
☐N/A, Please Explain _____

Occupational Health and Safety
Is your occupational health and safety policy externally audited?
☐Yes, nationally and worldwide
☐ Yes, only nationally
☐No
☐Don't Know
☐N/A, Please Explain _____

What are your corporate health and safety targets for :
Fatalities_____
Recordable Injuries_____
Days Away From Work Restricted or Transferred_____
Near Misses_____
Occupational Illnesses_____

How do you ensure that safety is incorporated as part of your corporate culture?
☐Raise safety awareness via training, incentives and deterrents, also incorporate daily safety moments in meetings, and site gatherings
☐ Introduce penalties for unsafe behavior
☐No procedure for ensuring the incorporation of safety in the culture
☐Don't Know
☐N/A, Please Explain _____

Human Capital (Attracting and Retaining Talent)
Do you have a formal documented human resource management policy?
☐Yes, nationally and worldwide

☐ Yes, only nationally
☐No
☐Don't Know
☐N/A, Please Explain _____

How do you measure the results of your HR policy?
☐Quantitative metrics, trends in training cost per employee versus turnover rates, value added per employee, exit interviews data analysis…etc.
☐ Qualitative exit interviews data analysis, employee satisfaction questionnaires
☐Don't measure
☐Don't Know
☐N/A, Please Explain _____

How often do you perform employee satisfaction surveys ?
☐Often
☐ Sometimes
☐Never
☐Don't Know
☐N/A, Please Explain _____

Please indicate how frequently employees are trained on the corporation's sustainability vision?
☐Often
☐ Sometimes
☐Never
☐Don't Know
☐N/A, Please Explain _____

Are there any programs in place to introduce skilled employees to community involvement projects?
☐Yes, several
☐ Yes, few
☐None
☐Don't Know
☐N/A, Please Explain _____

Research and Development
Please provide the percentage of your annual investment on R&D? _____
How many patent pending drugs do you have in the pipeline? _____
Do you perform R&D on diseases predominantly found in Developing Countries?
Yes____ No____
What percentage of your R&D budget is on diseases found mainly in developing countries?

☐50-75%
☐ 25-50%
☐>25%
☐Don't Know
☐N/A, Please Explain _____

How do you insure the fair sharing of benefits from access to resources at host countries?
☐Joint Research Efforts, Technical Training
☐ Payment of royalties
☐ Single Initial Payment
☐Don't Know
☐N/A, Please Explain _____

Bioethics/Animal Testing
Does your company have a formal Bioethics policy?
☐Yes, formal and documented
☐ Yes, informal
☐None
☐Don't Know
☐N/A, Please Explain _____

Does your corporation have formal policies on animal testing?
☐Yes, formal documented
☐ Yes, informal
☐None
☐Don't Know
☐N/A, Please Explain _____

How do you measure compliance with these policies?
☐Proactive, periodic reviews
☐ Reactive investigations to claims
☐Don't measure
☐Don't Know
☐N/A, Please Explain _____

Improving access to drugs in developing countries
Do you have a formal policy to improve accessibility of drugs in developing countries?
☐Yes, formal documented
☐ Yes, informal
☐None
☐Don't Know
☐N/A, Please Explain _____

What does your strategy lean towards in improving drug accessibility in developing countries?
☐Drug Donations
☐ Different pricing policies
☐None
☐Don't Know
☐N/A, Please Explain _____

What is your percentage annual expense on drug donations or drug subsidies to developing countries? _____

Corporate Citizenship/Philanthropy

Do you have a corporate citizenship/philanthropy strategy?
Yes_____ No_____

What is your area of Philanthropic focus?
☐Community relations
☐ Improving the quality of life
☐Employee involvement and skills donation
☐Supporting the arts, or educational projects
☐Diversified interests

How do you measure the impact of your philanthropy?
☐Social Indicators of improvement in the quality of life in the community
☐ Stock market reaction to reputation enhancement
☐Don't measure
☐Don't Know
☐N/A, Please Explain _____

What is your annual philanthropic budget? _____
Do you endorse the principals of Responsible Care (RC)?
☐Yes, nationally and worldwide
☐ Yes, nationally only
☐No
☐Don't Know
☐N/A, Please Explain _____

Do you measure the degree of your corporate commitment to RC initiatives?
☐Yes, nationally and worldwide
☐ Yes, nationally only
☐Don't measure

☐Don't Know
☐N/A, Please Explain _____

How do you measure the success or the impact of your RC initiatives? Please explain_____
_____
_____

The Environmental Pillar
Environmental Management Systems
Does your company's environmental policy apply to :
☐Environmental Impact of Products
☐ Environmental Impact of Operations
☐ Environmental Impact of Service
☐Don't Know
☐N/A, Please Explain _____

What is the main focus of your environmental policy?
☐Land Use
☐Natural Resources
☐ Biodiversity
☐Pollution and Waste
☐Alternative fuels
☐Other, Please Explain _____

Did your company establish quantified environmental targets for reducing CFCs' contributions to carbon sequestration?
☐Yes, worldwide
☐ Yes, national
☐ No targets set
☐Don't Know
☐N/A, Please Explain _____

Do you utilize (EMSs) environmental management systems ?
☐Yes, often
☐ Yes, Rarely
☐ Never
☐Don't Know
☐N/A, Please Explain _____

Is your EMS system certified?
☐Yes, ISO 14001, JIS Q 14001, EMAS certification
☐ Yes, audited by independent consultant

☐ Not certified nor audited
☐Don't Know
☐N/A, Please Explain _____

What are EMSs used to evaluate?
☐New Projects and ongoing operations
☐ Only new projects
☐ Only EPA regulated production units
☐Don't Know
☐N/A, Please Explain _____

Does your corporate policy require Environmental Impact Assessments (EIAs) for capital investment ventures?
☐Yes, often
☐ Yes, Rarely
☐ Never
☐Don't Know
☐N/A, Please Explain _____

Does your corporate Policy require regular Environmental Impact Statements (EISs) or reporting on corporate investment?
☐Yes, often
☐ Yes, Rarely
☐ Never
☐Don't Know
☐N/A, Please Explain _____

Eco-efficiency

Does your company have a reduction target for GHG emissions?
☐Yes, a 5 year plan
☐ Yes, a 10 year plan
☐ No Plan
☐Don't Know
☐N/A, Please Explain _____

What is your reduction target in metric tons? _____

Does your company have a reduction target for VOC gases?
☐Yes, a 5 year plan
☐ Yes, a 10 year plan
☐ No Plan
☐Don't Know

☐N/A, Please Explain _____

What is your reduction target in metric tons? _____

Does your company have a target for COD (Chemical Oxygen Demand) in wastewater?
☐Yes, a 5 year plan
☐ Yes, a 10 year plan
☐ No Plan
☐Don't Know
☐N/A, Please Explain _____

What is your reduction target in mg/L? _____

Does your company have a reduction target for waste generation?
☐Yes, a 5 year plan
☐ Yes, a 10 year plan
☐ No Plan
☐Don't Know
☐N/A, Please Explain _____

What is your reduction target in metric tons? _____

Does your company have a reduction target for energy consumption?
☐Yes, a 5 year plan
☐ Yes, a 10 year plan
☐ No Plan
☐Don't Know
☐N/A, Please Explain _____

What is your reduction target in GJ? _____

Does your company have a formal investigation strategy for feasible green electricity alternatives?
☐Yes, formal and mandatory, used in every RFR (Request for Resources)
☐ Yes, voluntary
☐ No such strategy
☐Don't Know
☐N/A, Please Explain _____

Does your company have a reduction target for water consumption?
☐Yes, a 5 year plan
☐ Yes, a 10 year plan

☐ No Plan
☐Don't Know
☐N/A, Please Explain _____

What is your reduction target in cubic meters? _____

Is your GHG inventory verified by an independent entity? Yes___ No__

What is your company's strategy to meeting environmental Targets? Please Explain
_____
_____
_____

Does your company engage in emissions trading?
☐Yes, often
☐ Yes, occasionally
☐ Never
☐Don't Know
☐N/A, Please Explain _____

Environmental Leadership

What is the position of the environmental lead at the highest level within your company?_____

What is reporting line of the environmental lead?
☐ Reports directly to the board of directors
☐ Reports to the chief executive officer
☐ Reports to a VP of operations or engineering
☐Not clear/Don't Know
☐N/A, please explain_____

How often are environmental awareness meetings held?
☐ Monthly
☐ Quarterly
☐ Annually
☐Never/Don't Know
☐N/A, please explain_____

Does your company endorse any incentive strategies for environmentally vigilant behavior?

☐ Often, monetary and symbolic awards

☐ Rarely
☐ Never
☐Don't Know
☐N/A, please explain_____

Does your company monitor environmental practices in contractors , vendors, and suppliers operations?
☐ Often
☐ Rarely
☐ Never
☐Don't Know
☐N/A, please explain_____

Does your company demand/encourage responsible environmental behavior in contractors, vendors and suppliers operations?
☐ Often
☐ Rarely
☐ Never
☐Don't Know
☐N/A, please explain_____

Does your company adopt an environmental profit and loss accounting system?
☐ Yes, a comprehensive system
☐ Yes, in some instances
☐ No such system in place
☐Don't Know
☐N/A, please explain_____

Does your corporate leadership comprehend and endorse the principles of ICREA?
☐ Yes, fully
☐ Yes, partially
☐ No
☐Don't Know
☐N/A, please explain_____

**SUSTAINABILITY COMPONENT OF PRE-PROJECT PLANNING**

Integrating Sustainability in Project Planning and definition

| | Definition Level at Authorization | | | | | | |
|---|---|---|---|---|---|---|---|
| A. Sustainability Concepts | (1) Modest <----------->Thorough (5) | | | | | | |
| A1. Preparation and documentation of formal plan addressing sustainability | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A2. Preparation and documentation of formal plan addressing communication between top management and project team | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B. Sustainability areas covered in plans | (1) Modest <----------->Thorough (5) | | | | | | |
| B1. Economic | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B2. Social | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B3. Environmental | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |

The Economic Pillar

| | Definition Level at Authorization | | | | | | |
|---|---|---|---|---|---|---|---|
| A. Financial Transparency Review | (1) Modest <----------->Thorough (5) | | | | | | |
| A1. Planning of formal review, involving top management | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A2. Preparation of formal financial documentation plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A3. Plan to train project team by business unit | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B. Investor Relations Study (IRS) | (1) Modest <----------->Thorough (5) | | | | | | |
| B1. Preparation and documentation of formal study | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B2. Plans for formal, facilitated sessions involving all stake holders | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B3. Plans for involvement of outside consultants in study facilitation | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C. Sustainability Benchmarking Study | (1) Modest <----------->Thorough (5) | | | | | | |
| C1. Preparation and documentation of formal study | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C2. Plans for formal, facilitated sessions involving all stake holders | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C3. Plans for involvement of outside consultants in study facilitation | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| D. Customer Satisfaction and Brand Loyalty Review | (1) Modest <----------->Thorough (5) | | | | | | |
| D1. Preparation and documentation of formal study | Yes | | No | | | NA | UNK |
| | ◘ | | ◘ | | | ◘ | ◘ |
| D2. Plans for formal, facilitated sessions involving all stake holders | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| D3. Plans for involvement of outside consultants in study facilitation | Yes | | No | | | NA | UNK |
| | ◘ | | ◘ | | | ◘ | ◘ |
| D4. Degree of communication of study results (Impact of capital project on brand name) to project team | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E. Communication with Business Unit / Marketing Department | (1) Modest <----------->Thorough (5) | | | | | | |
| E1. Preparation and documentation of a clear plan for the involvement of the business unit in the Capital project | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E2. organization of formal meetings between project team and business unit | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E3. documentation of key business objectives of the capital project | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E4. Communication of Business Objectives to key project team members | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |

The Social Pillar

| | Definition Level at Authorization |
|---|---|
| A. Ethics and Codes of Conduct | (1) Modest <----------->Thorough (5) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A1. Establishing a Code of Ethical Conduct | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A2. Plan to communicate the code to team members | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A3. Clarity of statement of penalties resulting from breaking the code | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B. Stakeholder Identification | (1) Modest <----------->Thorough (5) | | | | | | |
| B1. Plans for a formal stakeholder identification process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B2. Plans for outside consultants involvement in the process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B3. Plans for documentation of the process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C. Referral to ILO's Conventions | (1) Modest <----------->Thorough (5) | | | | | | |
| C1. Plans for a formal referral process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C2. Plans for outside consultants involvement in the process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C3. Plans for documentation of the process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| D. Health and Safety Plans | (1) Modest <----------->Thorough (5) | | | | | | |
| D1. Plans for a formal HSE process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| D2. Plans for involvement of outside consultants or facilitators in the process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| D3. Plans for formal documentation of minor incidents and near misses | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E. Human Resource Management Plans | (1) Modest <----------->Thorough (5) | | | | | | |
| E1. Plans for human capital attraction and retention (during and after the project) | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E2. Plans for outside consultants involvement in the process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| E3. Plans for human recourse training | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| F. R&D | (1) Modest <----------->Thorough (5) | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| F1. Preparation of plans for sharing R&D results with host country | Yes | | No | | | NA | UNK |
| | ◘ | | ◘ | | | ◘ | ◘ |
| F2. Preparation of plans for legally documenting the ownership strategy of research results | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| G. Improving Access To Drugs In Developing Countries | (1) Modest <----------->Thorough (5) | | | | | | |
| G1. Preparation of plans to improve access to drugs in developing countries | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| G2. Preparation of plans for "differential drug pricing" | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| H. Philanthropy | (1) Modest <----------->Thorough (5) | | | | | | |
| H1. Preparation of plans for Philanthropic efforts | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| H2. Preparation of plans to measure the impact of philanthropy in the community | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |

The Environmental Pillar

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Definition Level at Authorization | | | | | | |
| A. Environmental Impact Assessment (EIA) | (1) Modest <----------->Thorough (5) | | | | | | |
| A1. Plans for a formal assessment process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A2. Preparation for the involvement of external auditors | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| A3. Preparation of plans for formal EIA documentation | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B. Eco-Efficiency | (1) Modest <----------->Thorough (5) | | | | | | |
| B1. Degree of preparation of an emission targets reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B2. Degree of preparation of a waste generation reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| B3. Degree of preparation of an energy consumption reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C. Environmental Permitting | (1) Modest <----------->Thorough (5) | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C1. Degree of preparation of a communication plan with the relevant environmental agency | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C2. Degree of preparation of the environmental permitting package | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |
| C3. If environmental permits are already approved at authorization, what is the degree of preparation of the plan to execute the permit requirements? I.e. agency suggestions | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ | ◘ |

**PROJECT PERFORMANCE METRICS**
Cost

Please indicate the Budgeted (Baseline) and Actual Project Costs by phase: If you know total project costs but have incomplete phase information, you may enter as much phase information as you know or just fill in the total project cost, estimated and actual.

Budget amounts should include contingency and correspond to baseline estimate, at time of authorization (start of detail design). The total project budget amount should include all planned expenses from pre-project planning through startup or to a "ready for use" condition, excluding the cost of land. The total actual project cost should include all actual project costs from pre-project planning through startup or to a "ready for use" condition, excluding the cost of land Actual costs should include the amounts expended during the project for in-house salaries, overhead, travel, etc.

| Project Phase | Baseline Budget (Including Contingency) | Amount of Contingency in Budget | Actual Phase Cost |
|---|---|---|---|
| Total Project Cost | | | |
| Pre-Project Planning | | | |
| Detail Design | | | |
| Procurement | | | |
| Demolition/Abatement | | | |
| Construction | | | |
| Startup | | | |

Schedule

Please indicate your company's Planned Baseline and Actual Project Schedule by phase: If you have incomplete phase information, please enter as much phase information as you know. Most importantly, however, you must enter overall project start and stop dates.

The dates for the planned schedule should be those in effect at the start of detail design. If you cannot provide an exact day for either the planned or actual, estimate to the nearest week in the form mm/dd/yyyy; for example, 1/8/2002, 2/15/2002, or 3/22/2002.

| Project Phase | Baseline Schedule | | Actual Schedule | |
|---|---|---|---|---|
| | Start mm/dd/yyyy | Stop mm/dd/yyyy | Start mm/dd/yyyy | Stop mm/dd/yyyy |
| Overall Project | | | | |
| Pre-Project Planning | | | | |
| Detail Design | | | | |
| Procurement | | | | |
| Demolition/Abatement | | | | |
| Construction | | | | |
| Startup | | | | |

Design Changes

Please record any changes to your project by phase in the table provided below. For each phase indicate whether a development or scope change has occurred, who instigated it, and the net cost and schedule impact resulting from each type of change.

Project Development Changes are changes required to execute the original scope of work or obtain original process basis. Scope Changes are changes in the base scope of work or process basis.

If you cannot provide the requested change information by phase but can provide the information for the total project. Indicate negative values for cost or schedule if the net changes produced a reduction. If no change orders were granted during a phase, write "0" in the "Total Number" columns.

| Project Phase | Development Change Occurred Yes/No | Scope Change Occurred Yes/No | Instigating functional Unit/ project Team Member | Net Cost Impact of Project Development Changes ($) | Net Cost Impact of Scope Changes ($) | Net Schedule Impact of Project Development Changes (weeks) | Net Schedule Impact of Scope Changes (weeks) |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Design | ☐Yes ☐No | ☐Yes ☐No | | | | | |
| Procurement | ☐Yes ☐No | ☐Yes ☐No | | | | | |
| Demolition/ Abatement | ☐Yes ☐No | ☐Yes ☐No | | | | | |
| Construction | ☐Yes ☐No | ☐Yes ☐No | | | | | |
| Startup | ☐Yes ☐No | ☐Yes ☐No | | | | | |
| Overall/Total | ☐Yes ☐No_ | ☐Yes ☐No_ | | | | | |

Safety
In the spaces below, please record the Total OSHA Number of Recordable Incident Cases and DART Cases (Days Away Restricted/Transferred). Next, please record the number of Near Misses, the Total Site Workhours, and the Number of Hours in Your Normal Work Week.

Use the U.S. Department of Labor's OSHA definitions for recordable injuries and lost workday cases among this project's workers. If you do not track in accordance with these definitions, click Unknown in the boxes below. A consolidated project OSHA 300 log is the best source for the data.

Total number of *Recordables*_____
Total number of *Days Away Cases* (Restricted and Transferred) _____
Total number of *Near Misses* occurred. _____
Total number of *Site Workhours* _____
Number of Hours in Normal Work Week_____

# Appendix B: Final Survey Version

GENERAL CORPORATE INFORMATION

Please feel free to type on this document and e-mail the completed response back or print the questionnaire, write out your answers and then mail back to the address provided in the letter.
Company Name: [redacted] Inc. Head Quarters Location: [redacted],
Major Industry Involvement (please mark ☑ any areas that apply)
X Oil and Petrochemical ☐Pulp and Paper
☐Automotive Assembly ☐Consumer Products
☐Microelectronics Manufacturing ☐Pharmaceutical Manufacturing
☐ Other

Contact Person: [redacted]
Function: [redacted]
Contact's Phone: [redacted]
Contact's Fax: [redacted]
Contact's E-mail Address: _____

SUSTAINABILITY / CORPORATE SOCIAL RESPONSIBILITY (CSR) UNIT

Location: [redacted] Number of Employees: 10_____
Title of Unit Lead: _V.P. Sustainable development_____
Number of Projects Handled by Unit Annually: ___10_____

Does your company have a sustainability Policy that targets strategic decisions? Yes _X No__

If yes, please rank the following areas in terms of strategic importance within your corporate policy: 1-6 (with 6 being most important)
X Maintaining current Business operations and creating future business opportunities
☐ Improving access to financial capital
☐Attracting and retaining talent
☐Encouraging technological innovation
☐Reducing the Ecological footprint
☐Giving back to the community

Does your company benchmark/measure/ audit its sustainability performance**?** Yes X No__

**Does your unit issue an annual sustainability report?** Yes _X_ No___
If Yes, Please attach one to this questionnaire.

**Is your corporation a member of BSR (Business for Social Responsibility)?** Yes _X_ No___

## CORPORATE SUSTAINABILITY COMMITMENT INDEX (CSCI)

### The Economic Pillar

| ***A. Corporate Organization and Strategic Sustainability Planning*** | **(1) No/ Hardly <----------> Yes/ Significantly (5)** ***(NA: Not Applicable, UNK: Unknown)*** | | | | | | |
|---|---|---|---|---|---|---|---|
| A1. Is CSR/ Sustainable Development the official responsibility of the board of directors? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A2. Is risk management the official responsibility of the board of directors? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A3. To what degree is the connection between risk management and Sustainable operation made at the corporate level? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A4. Is there a clear documented policy for the required damage control actions and the chain of responsibility for failure to manage damaging crisis situations? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| A5. Would you expect to see mass resignations in your corporation in the case of very image damaging crisis? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| ***B. Sustainability and Investor Relations*** | **(1)No/ Hardly <----------->Yes/Often (5)** | | | | | | |
| B1. Do you conduct training sessions to educate corporate financial analysts and corporate investors about sustainability issues and their weight on your corporate bottom line? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B2. Do you conduct Investor Perception Studies (IPSs) or other similar studies? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B3. Are the results of perception studies disseminated within the corporation? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B4. Are corporate financial records and audit results transparent and available to employees and investors? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***C. Sustainability Benchmarking Study*** | **(1) No/ Hardly <----------->Yes/Often (5)** | | | | | | |
| C1. Do you benchmark sustainability performance in your corporation? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| C2. Do you use any other benchmarking techniques within the organization to supplement your sustainability performance studies? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| C3. Do you communicate the results of the benchmarking exercise to employees? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***D. Customer Satisfaction and Brand Loyalty Review*** | **(1) No/Hardly <----------->Yes/ Significantly (5)** | | | | | | |
| D1. Does your corporation place considerable emphasis on its brand name? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| D2. Does your corporation associate the value of your brand name(s) with the company's public image? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| D3. Is corporate social responsibility or sustainable development viewed as a means to maintain brand name loyalty? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D4. Do you use Customer Quality Questionnaires to monitor customer satisfaction? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***E. Marketing Policies*** | **(1) No/Hardly <----------->Yes/ Often(5)** | | | | | | |
| E1. Does your Corporation implement the IFPMA Code of Pharmaceutical Marketing Practices? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| E2. Does your organization use responsible political lobbying to shed light on important public health issues and influence policy on addressing public health emergencies? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| E3. Does your corporation work with central governments to develop higher healthcare infrastructure and reduce the re-importation of differentially priced products? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |

## The Social Pillar

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***A. Ethics and Codes of Conduct*** | **(1) No/Hardly <----------->Yes/ Mostly(5)** | | | | | | |
| A1. Does your corporation have a clearly defined code of ethical conduct for national and international operations? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A2. Does the code address corruption and bribery, EH&S, discrimination, sexual harassment, and whistelblowing? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A3. Does your company have a disclosure of political or charitable contributions policy? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A4. Does your policy cover all contractors: alliance contractors, subcontractors, suppliers, subsidiaries, and joint ventures? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| ***B. Stakeholder Identification*** | **(1) No/Hardly <----------->Yes/ Often (5)** | | | | | | |
| B1. Does your company use a formal procedure of identifying stakeholders on a project or a financial venture? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B2. Do you typically consider local communities and consumer groups as stakeholders? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B3. How often do you carry out Social Impact Assessments (SIA) and prepare Social Impact Statements when assessing the viability of capital ventures? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***C. Labor Practices*** | **(1) No/Hardly <----------->Yes/ Comprehensive (5)** | | | | | | |
| C1. Do you have a clear policy following ILO's conventions? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| C2. Is there a corporate policy to allow your employees to report violations without fear of retaliation? | | | | | | | |
| | | | | | X | | |
| C3. Does your corporation adopt a clear endorsement of the ILO's Tripartite Declaration (Multinational Corporations and Social Policy)? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| C4. Does your corporation adopt a clear endorsement of OECD Guidelines for Multinational Corporations? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| C5. Does your corporation adopt a clear endorsement of the ground rules of Fair Trade Agreements? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| **D. Health and Safety Plans** | **(1) No/Hardly <----------->Yes/ Mostly (5)** | | | | | | |
| D1. Is your occupational health and safety policy | 1 | 2 | 3 | 4 | 5 | NA | UNK |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| externally audited? | | | | | X | | |
| D2. Do you have corporate practices that ensure the incorporation of safety as part of your corporate culture? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| **E. Human Capital (Attract & Retain Talent)** | **(1) No/Hardly <----------->Yes/ Often(5)** | | | | | | |
| E1. Do you measure the results of your HR policy? E.g. Employee satisfaction surveys | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| E2. Do you train employees on the corporate sustainability vision or involve them in community projects? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |

| | | | |
|---|---|---|---|
| **F. R&D** | **(1) 0% <----------->100% (5)** | | |
| F1. What percentage of your annual investment is on R&D? | % | NA | UNK |
| | 2 | | |
| F2. What percentage of your R&D investment is on disease found mainly in developing countries? | % | NA | UNK |
| | 0 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **G. Bioethics and Improving Drug Access** | **(1) No/Hardly <----------->Yes/ Comprehensive(5)** | | | | | | |
| G1. Does your corporation have a policy that insures the fair sharing of benefits from access to resources at host countries? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | X | |
| G2. Does your corporation have a formal Bioethics policy? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | X | |
| G3. Does your corporation have a formal policy on animal testing? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | X | |
| G4. Do you have a formal policy to improve accessibility of drugs in developing countries? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | X | |
| **H. Philanthropy** | **(1) No/Hardly <----------->Yes/ Mostly(5)** | | | | | | |
| H1. Do you have a detailed corporate citizenship/philanthropy strategy? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| H2. Do you endorse the principals of Responsible Care (RC)? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| H3. Do you measure the impact of your philanthropy in the community? E.g. by social indicators of improvement to the local quality of life. | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |

## The Environmental Pillar

***Instructions: please rate the degree to which the question applies to your system. For instance in question A1 if your policy applies to products only mark it as 2, if it applies to products and some operations mark it as 3; if the policy applies to both products and operations then mark it as four or five.***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***A**. Environmental Impact Assessment (EIA)* | **(1) No/Hardly <----------->Yes/ Mostly (5)** | | | | | | |
| A1. Does your corporation's environmental policy apply to the environmental impact of products, operations, and services? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A2. Does your environmental policy involve land use, natural | 1 | 2 | 3 | 4 | 5 | NA | UNK |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| resources, biodiversity, pollution and waste, and alternative fuels? | | | | | X | | |
| A3. Did your corporation establish quantified environmental targets for reducing CFC's contributions to carbon sequestration? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A4. Do you utilize ISO certified Environmental Management Systems (EMSs)? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | X | | | | | |
| A5. Does your corporate policy require Environmental Impact Assessments (EIAs) for capital projects or investment ventures? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***B. Eco-Efficiency*** | **(1) No/Hardly <----------Yes/ Mostly (5)** | | | | | | |
| B1. Does your corporation have reduction targets for GHG emissions, VOC gases, and COD in wastewater? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B2. Des your company have a waste generation reduction plan? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| B3. Does you company have an energy consumption reduction plan? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| B4. Does your company have a formal investigation strategy for feasible green electricity alternatives? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***C. Environmental Leadership*** | **(1) No/Hardly <----------Yes/ Mostly (5)** | | | | | | |
| C1. Does your corporate leadership comprehend and endorse the principles of ICREA? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| C2. Does your company endorse any incentive strategies for environmentally vigilant behavior? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| C3. Does your company adopt an environmental profit and loss accounting system? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| C4. Does your company monitor environmental practices in contractors, vendors, and suppliers operations? | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |

## CAPITAL PROJECT DATA

**Please provide some information on one large project that involved the application of your corporate sustainability policy.**

- This data will be highly confidential and specifics will not be shared when publicly presenting the results.
- Presentation of the research results will only show aggregated outcomes and no reference will be made to specific companies or projects.
- The aim of this research is to raise the profile of sustainable policies by telling an aggregate picture of sustainable projects success stories across corporations.
- However, feel free to refer to the project with a code name or number if that makes you feel more comfortable.

## General Project Information

**Project ID:** _____ (please do not fill out, for data analysis purposes only)

**Please provide the Name that you will use to refer to this Project:**
[redacted]_____

**Project Location:** [redacted]_____

**Project Location**: International (Country) _____

**Contact Person:** (Name of knowledgeable person) [redacted]_____

Contact's Phone: _[redacted]

Contact's Fax: __[redacted]

Contact's E-mail Address: _____

Please provide a short project scope description: what are you building? _100,000 + bbl per day bitumen upgrading facility

_____

_____

## Sustainability Component of Project Planning Index (SCPPI)

## Integrating Sustainability Policy in Project Planning and Definition

***Please provide your judgment of the status of integration of sustainability policy in your chosen project's planning activities, at the time of authorization (obtaining commitment for funds from top management)***

### The Economic Pillar

| | **Level of Planning at Authorization** | | | | | | |
|---|---|---|---|---|---|---|---|
| ***A. Financial Transparency Review*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| A1. Status of preparation and documentation of guidelines for financial transparency during capital projects execution – especially in international projects | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| | **(1) Modest <-----(3) Fair -----> Extensive (5)** | | | | | | |
| A2. Degree of interaction between project team and business unit | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| ***B. Investor Relations Study (IRS)*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| B1. Status of preparation and documentation of a formal IRS study | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | X | | | |
| ***C. Sustainability Benchmarking Study*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| C1. Status of preparation and documentation of a formal benchmarking study | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| C2. Involvement of outside consultants in study facilitation | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| ***D. Customer Satisfaction and Brand Loyalty Review*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D1. Status of preparation and documentation of formal customer satisfaction study | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| | **(1) Modest <-----(3) Fair -----> Extensive (5)** | | | | | | |
| D2. Involvement of outside consultants in study facilitation | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | X | | | | |
| D3. Degree of communication of study results (Impact of capital project on brand name) to project team | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |

## The Social Pillar

| | **Level of Planning at Authorization** | | | | | | |
|---|---|---|---|---|---|---|---|
| ***A. Ethics and Codes of Conduct*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| A1. Status of Corporate Code of Ethical Conduct | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A2. Status of communication of the code to team members | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***B. Stakeholder Identification*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| *B1.* Formal stakeholder identification process | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***C. Referral to ILO's Conventions*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| *C1.* Formal referral process to ILO's Conventions | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | | X |
| **D. Health , Safety and Environmental Plans** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| D1. Status of formal HSE plans for project | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| D2. Status of plans to monitor and track OSHA incidents and near misses | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| **E. Human Resource Management Plans** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| E1. Status of plans for human capital attraction and retention (during and after the project startup) | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| E2. Status of employee involvement in local community projects | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| **F. R&D** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| F1. Status of plans for sharing R&D results with host country | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | X | | | | | |
| F2. Status of plans to legally document the ownership strategy of research results | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| **G. Improving Access To Drugs In Developing Countries** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| G1. Status of plans to improve access to drugs in developing countries | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | X | |
| G2. Status of plans for "differential drug pricing" | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | | X | |
| **H. Philanthropy** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| H1. Status of plans for Philanthropic efforts in the project's neighborhood / local community | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| H2. Status of plans to measure the impact of philanthropy in the community | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |

## The Environmental Pillar

| | Level of Definition at Authorization | | | | | | |
|---|---|---|---|---|---|---|---|
| ***A.*** *Environmental Impact Assessment (EIA)* | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| A1. Status of perpetration and documentation of a formal EIA | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| A2. Involvement of external auditors | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***B. Eco-Efficiency*** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | |
| B1. Status of preparation and documentation of an emission targets reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B2. Status of preparation and documentation of a waste generation reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| B3. Status of preparation and documentation of an energy consumption reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |
| ***C. Environmental Permitting*** | **(1) Not Applied <---(3) Applied--> Obtained(5)** | | | | | | |
| *C1.* Status of application for environmental permits | 1 | 2 | 3 | 4 | 5 | NA | UNK |
| | | | | | X | | |

## PROJECT PERFORMANCE METRICS

***Please indicate the Budgeted (Estimated) and Actual Project Costs and the Estimated and Actual Durations in this project.***

### Cost

| | Baseline Budget (Including Contingency) | Amount of Contingency in Budget | Actual Project Cost |
|---|---|---|---|
| Total Project Cost (in US $) | 5 Billon | - | 5 Billion |

### Schedule

| | Estimated project Duration in months | Actual Project Duration | Date of Project Authorization mm/yyyy |
|---|---|---|---|
| Total Project Duration (project definition+ detailed engineering+ construction+ startup) | 6 years | 6.25 years | 1998 |

## Design Changes

Design Changes are changes required to achieve the original objective of the project (carryout the original scope of work at authorization). Design changes are not Scope Changes, which are changes in the original project objectives, baseline scope of work or process basis.

| Type of Change | Occurred in project | Who Instigated Changes? Project team, business, regulatory authorities..etc. | Approximate Impact of Changes in Baseline Cost (In US $) | Approximate Impact of Change in Baseline Schedule |
|---|---|---|---|---|
| Design Changes | Yes___<br>No____ | | | _____<br>weeks |
| Scope Changes | Yes___<br>No____ | | | _____<br>weeks |

## Safety

Please use the U.S. Department of Labor's OSHA definitions for recordable injuries and lost workday cases among this project's workers

Total number of Recordables___0_____
Total number of Days Away Cases -Restricted and Transferred(DART) __0_____
Total number of Site Workhours _____2,000,000,000_____ labor hours_____
Number of Hours in Normal Work Week_____40_____

# Appendix C: Index Algorithm Computation

| CSCI | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***The Economic Pillar*** | | | | | | | | | **CSCI Score** | | |
| **A. Corporate Organization and Strategic Sustainability Planning** | **(1) No/ Hardly <----------> Yes/ Significantly (5)** | | | | | | | | | | |
| | ***(NA: Not Applicable, UNK: Unknown)*** | | | | | | | | | | |
| A1. Is CSR/ Sustainable Development the official responsibility of the board of directors? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| A2. Is risk management the official responsibility of the board of directors? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **4** | | |
| | | | | X | | | | | | | |
| A3. To what degree is the connection between risk management and Sustainable operation made at the corporate level? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| A4. Is there a clear documented policy for the required damage control actions and the chain of responsibility for failure to manage damaging crisis situations? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **4** | | |
| | | | | X | | | | | | | |
| A5. Would you expect to see mass resignations in your corporation in the case of very image damaging crisis? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **3** | | |
| | | | X | | | | | | | | |
| **B. Sustainability and Investor Relations** | **(1)No/ Hardly <---------- >Yes/Often (5)** | | | | | | | | | | |
| B1. Do you conduct training sessions to educate corporate financial analysts and corporate investors about sustainability issues and their weight on your corporate bottom line? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| B2. Do you conduct Investor | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Perception Studies (IPSs) or other similar studies? | | | | | | | | | | | |
| | | | | | X | | | | | | |
| B3. Are the results of perception studies disseminated within the corporation? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| B4. Are corporate financial records and audit results transparent and available to employees and investors? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| **C. Sustainability Benchmarking Study** | **(1) No/ Hardly <---------- >Yes/Often (5)** | | | | | | | | | | |
| C1. Do you benchmark sustainability performance in your corporation? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| C2. Do you use any other benchmarking techniques within the organization to supplement your sustainability performance studies? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **4** | | |
| | | | | X | | | | | | | |
| C3. Do you communicate the results of the benchmarking exercise to employees? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| **D. Customer Satisfaction and Brand Loyalty Review** | **(1) No/Hardly <----------->Yes/ Significantly (5)** | | | | | | | | | | |
| D1. Does your corporation place considerable emphasis on its brand name? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| D2. Does your corporation associate the value of your brand name(s) with the company's public image? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **5** | | |
| | | | | | X | | | | | | |
| D3. Is corporate social responsibility or sustainable development viewed as a means to maintain brand name loyalty? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **4** | | |
| | | | | X | | | | | | | |
| D4. Do you use Customer Quality Questionnaires to monitor customer satisfaction? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **4** | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | X | | | | | | | |
| **E. Marketing Policies** | **(1) No/Hardly <---------- >Yes/ Often(5)** | | | | | | | | | | |
| E1. Does your Corporation implement the IFPMA Code of Pharmaceutical Marketing Practices? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **3** | | |
| | | | X | | | | | | | | |
| E2. Does your organization use responsible political lobbying to shed light on important public health issues and influence policy on addressing public health emergencies? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **3** | | |
| | | | X | | | | | | | | |
| E3. Does your corporation work with central governments to develop higher healthcare infrastructure and reduce the re-importation of differentially priced products? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | **3** | | |
| | | | X | | | | | | | | |
| | | | | | | | | | | | |
| ***The Social Pillar*** | | | | | | | | | | | |
| **A. Ethics and Codes of Conduct** | | **(1) No/Hardly <---------- >Yes/ Mostly(5)** | | | | | | | | | |
| A1. Does your corporation have a clearly defined code of ethical conduct for national and international operations? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| A2. Does the code address corruption and bribery, EH&S, discrimination, sexual harassment, and whistelblowing? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| A3. Does your company have a disclosure of political or charitable contributions policy? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| A4. Does your policy cover all contractors: alliance contractors, subcontractors, suppliers, subsidiaries, and joint ventures? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 3 | | |
| | | | | X | | | | | | | |
| **B. Stakeholder Identification** | | **(1) No/Hardly <---------- >Yes/ Often (5)** | | | | | | | | | |
| B1. Does your company use a formal procedure of identifying stakeholders on a project or a financial venture? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | X | | | | | |
| B2. Do you typically consider local communities and consumer groups as stakeholders? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 4 | | |
| | | | | | X | | | | | | |
| B3. How often do you carry out Social Impact Assessments (SIA) and prepare Social Impact Statements when assessing the viability of capital ventures? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 3 | | |
| | | | | X | | | | | | | |
| **C. Labor Practices** | | **(1) No/Hardly <----------->Yes/ Comprehensive (5)** | | | | | | | | | |
| C1. Do you have a clear policy following ILO's conventions? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 0 | | |
| | | | | | | | | X | | | |
| C2. Is there a corporate policy to allow your employees to report violations without fear of retaliation? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| C3. Does your corporation adopt a clear endorsement of the ILO's Tripartite Declaration (Multinational Corporations and Social Policy)? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 0 | | |
| | | | | | | | | X | | | |
| C4. Does your corporation adopt a clear endorsement of OECD Guidelines for Multinational Corporations? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 0 | | |
| | | | | | | | | X | | | |
| C5. Does your corporation adopt a clear endorsement of the ground rules of Fair Trade Agreements? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 4 | | |
| | | | | | X | | | | | | |
| **D. Health and Safety Plans** | | **(1) No/Hardly <----------->Yes/ Mostly (5)** | | | | | | | | | |
| D1. Is your occupational health and safety policy externally audited? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| D2. Do you have corporate practices that ensure the incorporation of safety as part of your corporate culture? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| **E. Human Capital (Attract & Retain Talent)** | | **(1) No/Hardly <----------->Yes/ Often(5)** | | | | | | | | | |
| E1. Do you measure the results of your HR policy? E.g. Employee satisfaction surveys | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |
| E2. Do you train employees on the corporate sustainability vision or involve them in community projects? | | 1 | 2 | 3 | 4 | 5 | NA | U NK | 5 | | |
| | | | | | | X | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **F. R&D** | **(1) 0% <--------->100% (5)** | | | | | | | | | | |
| F1. What percentage of your annual investment is on R&D? | % | NA | UNK | | | | | | | | |
| | 5.56 | | | 1 out of 18 billion | | | | | | | |
| F2. What percentage of your R&D investment is on disease found mainly in developing countries? | % | NA | UNK | | | | | | | | |
| | 0 | | | | | | | | | | |
| **G.GG. Bioethics and Improving Drug Access** | **(1) No/Hardly <----------->Yes/ Comprehensive(5)** | | | | | | | | | | |
| G1. Does your corporation have a policy that insures the fair sharing of benefits from access to resources at host countries? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| G2. Does your corporation have a formal Bioethics policy? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| G3. Does your corporation have a formal policy on animal testing? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| G4. Do you have a formal policy to improve accessibility of drugs in developing countries? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |
| | | | 3 | | | | | | | | |
| **H. Philanthropy** | **(1) No/Hardly <----------->Yes/ Mostly(5)** | | | | | | | | | | |
| H1. Do you have a detailed corporate citizenship/philanthropy strategy? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| H2. Do you endorse the principals of Responsible Care (RC)? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| H3. Do you measure the impact of your philanthropy in the community? E.g. by social indicators of improvement to the local quality of life. | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| | | | | | | | | | | | |
| ***The Environmental Pillar*** | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A. Environmental Impact Assessment (EIA)** | **(1) No/Hardly <----------->Yes/ Mostly (5)** | | | | | | | | | | |
| A1. Does your corporation's environmental policy apply to the environmental impact of products, operations, and services? | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | | 5 |
| | | | | | X | | | | | | |
| A2. Does your environmental policy involve land use, natural resources, biodiversity, pollution and waste, and alternative fuels? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| A3. Did your corporation establish quantified environmental targets for reducing CFC's contributions to carbon sequestration? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| A4. Do you utilize ISO certified Environmental Management Systems (EMSs)? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |
| | | | X | | | | | | | | |
| A5. Does your corporate policy require Environmental Impact Assessments (EIAs) for capital projects or investment ventures? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| **B. Eco-Efficiency** | **(1) No/Hardly <----------->Yes/ Mostly (5)** | | | | | | | | | | |
| B1. Does your corporation have reduction targets for GHG emissions, VOC gases, and COD in wastewater? | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | | 5 |
| | | | | | X | | | | | | |
| B2. Des your company have a waste generation reduction plan? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 4 | | |
| | | | | X | | | | | | | |
| B3. Does you company have an energy consumption reduction plan? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| B4. Does your company have a formal investigation strategy for feasible green electricity alternatives? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 4 | | |
| | | | | X | | | | | | | |
| **C. Environmental Leadership** | **(1) No/Hardly <----------->Yes/ Mostly (5)** | | | | | | | | | | |
| C1. Does your corporate leadership comprehend and endorse the principles of ICREA? | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | | 0 |
| | | | | | | | X | | | | |
| C2. Does your company endorse any incentive strategies for environmentally vigilant behavior? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |
| | | | X | | | | | | | | |
| C3. Does your company adopt an | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| environmental profit and loss accounting system? | | | | | | | | | | | |
| | | | X | | | | X | | | | |
| C4. Does your company monitor environmental practices in contractors, vendors, and suppliers operations? | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| | | | | | | | **Total CSCI Score** | **226** | | | |
| | | | | | | | **Total Possible CSCI Score** | | **275** | | |
| | | | | | | | **CSCI SCORE TRANSFORMED TO 1-10 SCALE** | | | **8.22** | |
| | | | | | | | | | | | |
| ***Sustainability Component of Project Planning Index (SCPPI)*** | | | | | | | | | | | |
| | | | | | | | | | | | |
| **Integrating Sustainability Policy in Project Planning and Definition** | | | | | | | | | | | |
| | | | | | | | | | | | |
| **The Economic Pillar** | | | | | | | | | **SCPPI SCORE** | | |
| | ***Level of Planning at Authorization*** | | | | | | | | | | |
| | | | | | | | | | | | |
| **A. Financial Transparency Review** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| A2. Status of preparation and documentation of guidelines for financial transparency during capital projects | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| execution – especially in international projects | | | | | | | | | | | |
| | | | | | X | | | | | | |
| | **(1) Modest <----(3) Fair -----> Extensive (5)** | | | | | | | | | | |
| A1. Degree of interaction between project team and business unit | | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | X | | | | | | | |
| **B. Investor Relations Study (IRS)** | **(1) Modest <----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| B1. Status of preparation and documentation of a formal IRS study | | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| **C. Sustainability Benchmarking Study** | **(1) Modest <----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| C1. Status of preparation and documentation of a formal benchmarking study | | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| C3. Involvement of outside consultants in study facilitation | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |
| | | | X | | | | | | | | |
| **D. Customer Satisfaction and Brand Loyalty Review** | **(1) Modest <----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| D1. Status of preparation and documentation of formal customer satisfaction study | | | 1 | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| | **(1) Modest <----(3) Fair ----->** | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Extensive (5)** | | | | | | | | | | |
| D3. Involvement of outside consultants in study facilitation | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | X | | | | | | | | |
| D4. Degree of communication of study results (Impact of capital project on brand name) to project team | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| | | | | | | | | | | | |
| **The Social Pillar** | | | | | | | | | | | |
| | ***Level of Planning at Authorization*** | | | | | | | | | | |
| **A. Ethics and Codes of Conduct** | **(1) Modest <-----(3) Fair ----> Complete (5)** | | | | | | | | | | |
| A1. Status of Corporate Code of Ethical Conduct | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| A2. Status of communication of the code to team members | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| **B. Stakeholder Identification** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| B1. Formal stakeholder identification process | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| **C. Referral to ILO's Conventions** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| C1. Formal referral process to ILO's Conventions | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | | | X | | | | |
| **D. Health , Safety and Environmental Plans** | **(1) Modest <-----(3) Fair -----> Complete** | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(5)** | | | | | | | | | | |
| D1. Status of formal HSE plans for project | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| D3. Status of plans to monitor and track OSHA incidents and near misses | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| **E. Human Resource Management Plans** | **(1) Most <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| E1. Status of plans for human capital attraction and retention (during and after the project startup) | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| E2. Status of employee involvement in local community projects | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| **F. R&D** | **(1) Most <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| F1. Status of plans for sharing R&D results with host country | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | X | | | | | | | | | |
| F2. Status of plans to legally document the ownership strategy of research results | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| **G. Improving Access To Drugs In Developing Countries** | **(1) Most <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| G1. Status of plans to improve access to drugs in developing countries | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | X | | | | | | | | |
| G2. Status of plans for "differential drug pricing" | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | | | | | | | | |
| **H. Philanthropy** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| H1. Status of plans for Philanthropic efforts in the project's neighborhood / local community | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| H2. Status of plans to measure the impact of philanthropy in the community | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 3 | | |
| | | | X | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **The Environmental Pillar** | | | | | | | | | | | |
| | ***Level of Definition at Authorization*** | | | | | | | | | | |
| **A. Environmental Impact Assessment (EIA)** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| A1. Status of perpetration and documentation of a formal EIA | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| A2. Involvement of external auditors | 1 | 2 | 3 | 4 | 5 | NA | UNK | | | | |
| | | | | | X | | | | 5 | | |
| **B. Eco-Efficiency** | **(1) Modest <-----(3) Fair -----> Complete (5)** | | | | | | | | | | |
| B1. Status of preparation and documentation of an emission targets reduction plan | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | | | X | | | | | | |
| B2. Status of preparation and documentation of a waste generation reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B3. Status of preparation and documentation of an energy consumption reduction plan | 1 | 2 | 3 | 4 | 5 | NA | UNK | | 5 | | |
| | | | | | X | | | | | | |
| **C. Environmental Permitting** | **(1) Not Applied <---(3) Applied--> Obtained (5)** | | | | | | | | | | |
| C1. Status of application for environmental permits | 1 | | | | 2 | 3 | 4 | 5 | NA | UNK | |
| | | | X | | | | | | | | |
| | | | | | | **Total SCPPI Score** | **119** | | | | |
| | | | | | | **Total Possible SCPPI Score** | | | **140** | | |
| | | | | | | **Total SCPPI Score on a 1-10 scale** | | | | **8.50** | |
| ***PROJECT PERFORMANCE METRICS*** | | | | | | | | | | | |
| **Cost** | | | | | | | | | | | |
| | **Baseline Budget** | **Amount of Contingency in Budget** | **Actual Project Cost** | **Cost Deviation** | | | | | | | |
| | **(Including Contingency)** | | | | | | | | | | |
| **Total Project Cost** (in US $) | $200,000,000.00 | | | $180,000,000.00 | **-10.0 %** | | | | | | |
| | | | | | | | | | | | |
| **Schedule** | | | | | | | | | | | |
| | **Estimated project Duration in months** | **Actual Project Duration** | **Date of Project Authorization** | **Schedule Deviation** | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **mm/yyyy** | | | | | | | | |
| **Total Project Duration** (project definition+ detailed engineering+ construction+ startup) | 3 | 3.09 | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | **3%** | | | | | | | |
| **Design Changes** | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **Type of Change** | **Occurred in project** | **Who Instigated Changes? Project team, business, regulatory authorities.. etc.** | **Approximate Impact of Changes in Baseline Cost (In US $)** | **Approximate Impact of Change in Baseline Schedule** | | | | | | | |
| | | | | | | | | | | | |
| **Design Changes** | Yes___ No____ | | | _____ ___ weeks | | | | | | | |
| **Scope Changes** | Yes___ No____ | | _____ weeks | | | | | | | | |
| **Safety** | | | | | | | | | | | |
| Total number of ***Recordables***_____ __ | | | | | | | | | | | |
| Total number of ***Days Away Cases*** - **Restricted and Transferred(DART)** _____ | | | | | | | | | | | |
| Total number of ***Site Workhours*** _____ | | | | | | | | | | | |
| Number of Hours in Normal Work Week_____ | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

# Appendix D: List of Attendees at Sustainability Research Seminar

**Sustainability Research Discussion Forum, CII Annual Conference, July 30, 2004. Vancouver, BC.**

| | Attendee | Organization |
|---|---|---|
| 1 | Les Sturgeon | Abbott Labs |
| 2 | Richard Marl | Bechtel |
| 3 | Dave Pepsin | DOE |
| 4 | David Rodier | Hatch |
| 5 | Bob Gutierrez | Kellogg Brown and Root |
| 6 | Lance Heackock | Mustang Engineering |
| 7 | Donald Basham | USACE |
| 8 | Walt Norko | USACE |
| 9 | Randy Abdallah | Walbridge Aldinger |
| 10 | Dr. Carl Haas | University of Texas @ Austin |
| 11 | Dr. Stephen Thomas | University of Texas @ Austin |
| 12 | Dr. Carlos Caldas | University of Texas @ Austin |
| 13 | Deborah DeGezelle | University of Texas @ Austin |
| 14 | Salwa Beheiry | University of Texas @ Austin |

# Appendix E: Survey Validation Tables

| Question # | CSCI Question | Original Mean | Original Median | Original STDEV | Validated Mean | Validated Median | Validated STDEV |
|---|---|---|---|---|---|---|---|
| 1 | A1. Is CSR/ Sustainable Development the official responsibility of the board of directors? | 3.88 | 4.00 | 1.58 | 3.53 | 4.00 | 1.50 |
| 2 | A2. Is risk management the official responsibility of the board of directors? | 3.94 | 4.00 | 1.60 | 3.76 | 4.00 | 1.52 |
| 3 | A3. To what degree is the connection between risk management and Sustainable operation made at the corporate level? | 3.53 | 4.00 | 1.66 | 3.53 | 4.00 | 1.66 |
| 4 | A4. Is there a clear documented policy for the required damage control actions and the chain of responsibility for failure to manage damaging crisis situations? | 4.35 | 5.00 | 1.22 | 3.18 | 4.00 | 1.24 |
| 5 | A5. Would you expect to see mass resignations in your corporation in the case of very image damaging crisis? | 4.00 | 4.00 | 1.06 | 2.24 | 2.00 | 0.97 |
| 6 | B1. Do you conduct training sessions to educate corporate financial analysts and corporate investors about sustainability issues and their weight on your corporate bottom line? | 3.29 | 3.00 | 1.61 | 3.06 | 3.00 | 1.64 |
| 7 | B2. Do you conduct Investor Perception Studies (IPSs) or other similar studies? | 3.94 | 4.00 | 1.20 | 3.53 | 4.00 | 1.46 |
| 8 | B3. Are the results of perception studies disseminated within the corporation? | 4.12 | 5.00 | 0.99 | 3.59 | 3.00 | 1.54 |
| 9 | B4. Are corporate financial records and audit results transparent and available to employees and investors? | 4.41 | 5.00 | 1.00 | 4.41 | 5.00 | 1.00 |
| 10 | C1. Do you benchmark sustainability performance in your corporation? | 4.18 | 4.00 | 0.88 | 3.88 | 4.00 | 1.11 |
| 11 | C2. Do you use any other benchmarking techniques within the organization to supplement your sustainability performance studies? | 3.76 | 4.00 | 0.97 | 3.65 | 4.00 | 0.93 |
| 12 | C3. Do you communicate the results of the benchmarking exercise to employees? | 4.12 | 5.00 | 1.05 | 3.53 | 3.00 | 1.33 |
| 13 | D1. Does your corporation place considerable emphasis on its brand name? | 4.29 | 5.00 | 0.92 | 4.29 | 5.00 | 0.92 |
| 14 | D2. Does your corporation associate the value of your brand name(s) with the company's public image? | 4.29 | 5.00 | 0.92 | 4.29 | 5.00 | 0.92 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 15 | D3. Is corporate social responsibility or sustainable development viewed as a means to maintain brand name loyalty? | 4.06 | 4.00 | 0.83 | 3.59 | 4.00 | 0.94 |
| 16 | D4. Do you use Customer Quality Questionnaires to monitor customer satisfaction? | 4.24 | 4.00 | 0.83 | 4.00 | 4.00 | 0.71 |
| 17 | E1. Does your Corporation implement the IFPMA Code of Pharmaceutical Marketing Practices? | 4.65 | 5.00 | 1.06 | 4.65 | 5.00 | 1.06 |
| 18 | E2. Does your organization use responsible political lobbying to shed light on important public health issues and influence policy on addressing public health emergencies? | 3.76 | 3.00 | 0.97 | 3.59 | 3.00 | 1.18 |
| 19 | E3. Does your corporation work with central governments to develop higher healthcare infrastructure and reduce the re-importation of differentially priced products? | 4.00 | 4.00 | 1.00 | 4.00 | 4.00 | 1.00 |
| 20 | A1. Does your corporation have a clearly defined code of ethical conduct for national and international operations? | 4.94 | 5.00 | 0.24 | 4.94 | 5.00 | 0.24 |
| 21 | A2. Does the code address corruption and bribery, EH&S, discrimination, sexual harassment, and whistelblowing? | 4.24 | 5.00 | 1.09 | 4.24 | 5.00 | 1.09 |
| 22 | A3. Does your company have a disclosure of political or charitable contributions policy? | 4.53 | 5.00 | 0.87 | 4.53 | 5.00 | 0.87 |
| 23 | A4. Does your policy cover all contractors: alliance contractors, subcontractors, suppliers, subsidiaries, and joint ventures? | 4.06 | 4.00 | 0.90 | 3.71 | 3.00 | 0.85 |
| 24 | B1. Does your company use a formal procedure of identifying stakeholders on a project or a financial venture? | 4.41 | 5.00 | 0.87 | 4.24 | 5.00 | 0.97 |
| 25 | B2. Do you typically consider local communities and consumer groups as stakeholders? | 4.00 | 4.00 | 0.79 | 4.00 | 4.00 | 0.79 |
| 26 | B3. How often do you carry out Social Impact Assessments (SIA) and prepare Social Impact Statements when assessing the viability of capital ventures? | 3.88 | 3.00 | 0.99 | 3.65 | 3.00 | 0.93 |
| 27 | C1. Do you have a clear policy following ILO's conventions? | 1.59 | 0.00 | 2.21 | 1.59 | 0.00 | 2.21 |
| 28 | C2. Is there a corporate policy to allow your employees to report violations without fear of retaliation? | 4.59 | 5.00 | 0.62 | 4.59 | 5.00 | 0.62 |
| 29 | C3. Does your corporation adopt a clear endorsement of the ILO's Tripartite Declaration (Multinational Corporations and Social Policy)? | 1.88 | 0.00 | 2.32 | 1.00 | 0.00 | 1.80 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 30 | C4. Does your corporation adopt a clear endorsement of OECD Guidelines for Multinational Corporations? | 2.29 | 1.00 | 2.20 | 2.29 | 1.00 | 2.20 |
| 31 | C5. Does your corporation adopt a clear endorsement of the ground rules of Fair Trade Agreements? | 4.41 | 5.00 | 1.23 | 4.00 | 5.00 | 1.54 |
| 32 | D1. Is your occupational health and safety policy externally audited? | 4.59 | 5.00 | 0.62 | 4.24 | 4.00 | 0.83 |
| 33 | D2. Do you have corporate practices that ensure the incorporation of safety as part of your corporate culture? | 4.76 | 5.00 | 0.44 | 4.71 | 5.00 | 0.47 |
| 34 | E1. Do you measure the results of your HR policy? E.g. Employee satisfaction surveys | 3.71 | 3.00 | 1.05 | 3.65 | 3.00 | 1.00 |
| 35 | E2. Do you train employees on the corporate sustainability vision or involve them in community projects? | 4.53 | 5.00 | 0.80 | 4.41 | 5.00 | 0.87 |
| 36 | F1. What percentage of your annual investment is on R&D? | 4.88 | 5.00 | 0.49 | 4.88 | 5.00 | 0.49 |
| 37 | F2. What percentage of your R&D investment is on disease found mainly in developing countries? | 5.00 | 5.00 | 0.00 | 5.00 | 5.00 | 0.00 |
| 38 | G1. Does your corporation have a policy that insures the fair sharing of benefits from access to resources at host countries? | 4.94 | 5.00 | 0.24 | 4.94 | 5.00 | 0.24 |
| 39 | G2. Does your corporation have a formal Bioethics policy? | 4.88 | 5.00 | 0.49 | 4.88 | 5.00 | 0.49 |
| 40 | G3. Does your corporation have a formal policy on animal testing? | 4.35 | 5.00 | 0.86 | 4.35 | 5.00 | 0.86 |
| 41 | G4. Do you have a formal policy to improve accessibility of drugs in developing countries? | 4.59 | 5.00 | 1.28 | 4.29 | 5.00 | 1.69 |
| 42 | H1. Do you have a detailed corporate citizenship/philanthropy strategy? | 2.41 | 1.00 | 1.80 | 2.41 | 1.00 | 1.80 |
| 43 | H2. Do you endorse the principals of Responsible Care (RC)? | 4.65 | 5.00 | 0.70 | 4.65 | 5.00 | 0.70 |
| 44 | H3. Do you measure the impact of your philanthropy in the community? E.g. by social indicators of improvement to the local quality of life. | 4.41 | 5.00 | 1.00 | 4.41 | 5.00 | 1.00 |
| 45 | A1. Does your corporation's environmental policy apply to the environmental impact of products, operations, and services? | 4.59 | 5.00 | 0.94 | 4.35 | 5.00 | 1.06 |
| 46 | A2. Does your environmental policy involve land use, natural resources, biodiversity, pollution and waste, and alternative fuels? | 2.88 | 3.00 | 0.86 | 2.88 | 3.00 | 0.86 |
| 47 | A3. Did your corporation establish quantified environmental targets for reducing CFC's contributions to carbon sequestration? | 4.59 | 5.00 | 0.51 | 4.47 | 5.00 | 0.62 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 48 | A4. Do you utilize ISO certified Environmental Management Systems (EMSs)? | 4.53 | 5.00 | 0.87 | 4.29 | 5.00 | 0.99 |
| 49 | A5. Does your corporate policy require Environmental Impact Assessments (EIAs) for capital projects or investment ventures? | 4.59 | 5.00 | 0.62 | 4.59 | 5.00 | 0.62 |
| 50 | B1. Does your corporation have reduction targets for GHG emissions, VOC gases, and COD in wastewater? | 4.18 | 5.00 | 1.01 | 4.18 | 5.00 | 1.01 |
| 51 | B2. Des your company have a waste generation reduction plan? | 3.94 | 5.00 | 1.39 | 3.94 | 5.00 | 1.39 |
| 52 | B3. Does you company have an energy consumption reduction plan? | 0.76 | 0.00 | 1.44 | 0.29 | 0.00 | 0.69 |
| 53 | B4. Does your company have a formal investigation strategy for feasible green electricity alternatives? | 2.94 | 3.00 | 1.48 | 2.24 | 2.00 | 1.56 |
| 54 | C1. Does your corporate leadership comprehend and endorse the principles of ICREA? | 2.35 | 2.00 | 1.54 | 1.53 | 2.00 | 1.28 |
| 55 | C2. Does your company endorse any incentive strategies for environmentally vigilant behavior? | 3.71 | 4.00 | 1.16 | 3.71 | 4.00 | 1.16 |
| 56 | C3. Does your company adopt an environmental profit and loss accounting system? | 3.71 | 4.00 | 1.16 | 3.71 | 4.00 | 1.16 |
| 57 | C4. Does your company monitor environmental practices in contractors, vendors, and suppliers operations? | 3.71 | 4.00 | 1.16 | 3.71 | 4.00 | 1.16 |

| Question # | SCPPI Question | Original Mean | Original Median | Original STDEV | Validated Mean | Validated Median | Validated STDEV |
|---|---|---|---|---|---|---|---|
| 1 | A2. Status of preparation and documentation of guidelines for financial transparency during capital projects execution – especially in international projects | 4.41 | 5.00 | 1.12 | 4.24 | 5.00 | 1.25 |
| 2 | A1. Degree of interaction between project team and business unit | 3.88 | 4.00 | 0.70 | 3.71 | 4.00 | 0.47 |
| 3 | B1. Status of preparation and documentation of a formal IRS study | 3.59 | 3.00 | 1.00 | 3.24 | 3.00 | 0.75 |
| 4 | C1. Status of preparation and documentation of a formal benchmarking study | 3.65 | 3.00 | 1.00 | 3.41 | 3.00 | 0.71 |
| 5 | C2. Involvement of outside consultants in study facilitation | 3.65 | 3.00 | 1.17 | 2.65 | 3.00 | 0.86 |
| 6 | D1. Status of preparation and documentation of formal customer satisfaction study | 4.47 | 5.00 | 0.87 | 4.18 | 5.00 | 1.01 |
| 7 | D3. Involvement of outside consultants in study facilitation | 3.65 | 3.00 | 1.06 | 2.76 | 3.00 | 0.56 |
| 8 | D4. Degree of communication of study results (Impact of capital project on brand name) to project team | 4.65 | 5.00 | 0.61 | 4.18 | 4.00 | 0.64 |
| 9 | A1. Status of Corporate Code of Ethical Conduct | 5.00 | 5.00 | 0.00 | 5.00 | 5.00 | 0.00 |
| 10 | A2. Status of communication of the code to team members | 4.53 | 5.00 | 0.87 | 3.71 | 4.00 | 0.99 |
| 11 | B1. Formal stakeholder identification process | 4.41 | 5.00 | 0.94 | 4.35 | 5.00 | 1.06 |
| 12 | C1. Formal referral process to ILO's Conventions | 2.59 | 3.00 | 2.12 | 1.12 | 0.00 | 1.45 |
| 13 | D1. Status of formal HSE plans for project | 4.76 | 5.00 | 0.56 | 4.53 | 5.00 | 0.72 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14 | D3. Status of plans to monitor and track OSHA incidents and near misses | 5.00 | 5.00 | 0.00 | 3.76 | 5.00 | 2.17 |
| 15 | E1. Status of plans for human capital attraction and retention (during and after the project startup) | 4.88 | 5.00 | 0.33 | 4.88 | 5.00 | 0.33 |
| 16 | E2. Status of employee involvement in local community projects | 3.76 | 4.00 | 0.97 | 3.59 | 4.00 | 1.00 |
| 17 | F1. Status of plans for sharing R&D results with host country | 3.94 | 5.00 | 1.60 | 2.82 | 2.00 | 1.42 |
| 18 | F2. Status of plans to legally document the ownership strategy of research results | 4.29 | 5.00 | 1.31 | 3.71 | 4.00 | 1.69 |
| 19 | G1. Status of plans to improve access to drugs in developing countries | 4.88 | 5.00 | 0.49 | 4.88 | 5.00 | 0.49 |
| 20 | G2. Status of plans for “differential drug pricing” | 4.88 | 5.00 | 0.49 | 4.88 | 5.00 | 0.49 |
| 21 | H1. Status of plans for Philanthropic efforts in the project’s neighborhood / local community | 4.53 | 5.00 | 0.80 | 4.24 | 5.00 | 1.03 |
| 22 | H2. Status of plans to measure the impact of philanthropy in the community | 3.59 | 3.00 | 1.33 | 2.65 | 3.00 | 1.11 |
| 23 | A1. Status of perpetration and documentation of a formal EIA | 4.41 | 5.00 | 0.80 | 4.41 | 5.00 | 0.80 |
| 24 | A2. Involvement of external auditors | 4.29 | 5.00 | 1.40 | 3.59 | 5.00 | 1.84 |
| 25 | B1. Status of preparation and documentation of an emission targets reduction plan | 4.47 | 5.00 | 0.72 | 4.12 | 4.00 | 0.86 |
| 26 | B2. Status of preparation and documentation of a waste generation reduction plan | 4.29 | 5.00 | 0.92 | 3.71 | 4.00 | 1.10 |
| 27 | B3. Status of preparation and documentation of an energy consumption reduction plan | 3.94 | 4.00 | 1.20 | 3.71 | 4.00 | 1.10 |
| 28 | C1. Status of application for environmental permits | 4.29 | 5.00 | 1.05 | 3.76 | 4.00 | 1.09 |

# Appendix F: Data Analysis

## Data Sample

| # | CSCI | SCPPI | Cost Deviation | Schedule Deviation | Design Changes | Safety |
|---|---|---|---|---|---|---|
| 1 | 9.56 | 8.4 | - | - | - | - |
| 2 | 8.69 | 7.9 | - | - | - | - |
| 3 | 8.40 | 8.0 | 0.00% | 0.00% | - | 0.00 |
| 4 | 8.91 | 7.8 | - | - | - | - |
| 5 | 8.15 | 8.8 | 0.00% | 0.00% | - | 0.00 |
| 6 | 7.35 | 6.8 | - | - | - | - |
| 7 | 7.45 | 7.1 | -10.00% | 0.00% | - | 0.00 |
| 8 | 8.15 | 7.8 | - | - | - | - |
| 9 | 6.44 | 6.9 | -14.90% | 6.25% | - | - |
| 10 | 7.64 | 8.5 | - | - | - | - |
| 11 | 5.53 | 5.6 | 1.00% | 0.00% | - | - |
| 12 | 7.67 | 8.4 | - | - | - | - |
| 13 | 7.49 | 8.2 | - | - | - | - |
| 14 | 5.89 | 5.6 | 3.50% | 29.00% | - | - |
| 15 | 7.96 | 8.1 | -3.00% | 8.33% | - | 0.00 |
| 16 | 5.42 | 5.5 | -0.26% | 33.33% | - | - |
| 17 | 8.22 | 8.5 | -10.00% | 3.00% | - | - |
| 18 | 7.89 | 9.3 | 40.35% | -6.67% | - | 0.66 |
| 19 | 7.09 | 8.6 | - | - | - | - |
| 20 | 8.00 | - | - | - | - | - |

Data Analysis

**Independent Variable CSCI**
**Dependent variable.. SCPPI** Method.. LINEAR

Listwise Deletion of Missing Data

| | |
|---|---|
| Multiple R | .84354 |
| R Square | .71156 |
| Adjusted R Square | .69233 |
| Standard Error | .60578 |

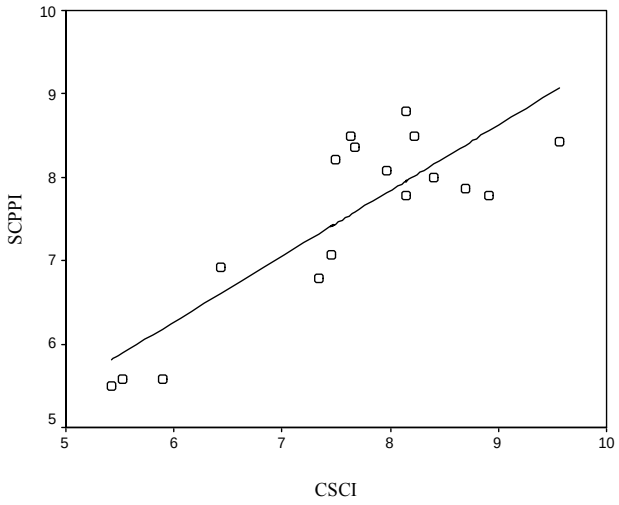
Analysis of Variance:

| | DF | Sum of Squares | Mean Square |
|---|---|---|---|
| Regression | 1 | 13.579470 | 13.579470 |
| Residuals | 15 | 5.504564 | .366971 |

F = 37.00421 Signif F = .0000

---------- Variables in the Equation ----------

| Variable | B | SE B | Beta | T | Sig T |
|---|---|---|---|---|---|
| CSCI | .786723 | .129329 | .843541 | 6.083 | .0000 |
| (Constant) | 1.546976 | .991632 | | 1.560 | .1396 |



**Independent Variable CSCI, Dependent variable.. COSTDEV**
Method.. CUBIC

Listwise Deletion of Missing Data

Multiple R .67391
R Square .45415
Adjusted R Square .27221
Standard Error 5.38236

Analysis of Variance:

| | DF | Sum of Squares | Mean Square |
|---|---|---|---|
| Regression | 2 | 144.62040 | 72.310198 |
| Residuals | 6 | 173.81880 | 28.969801 |

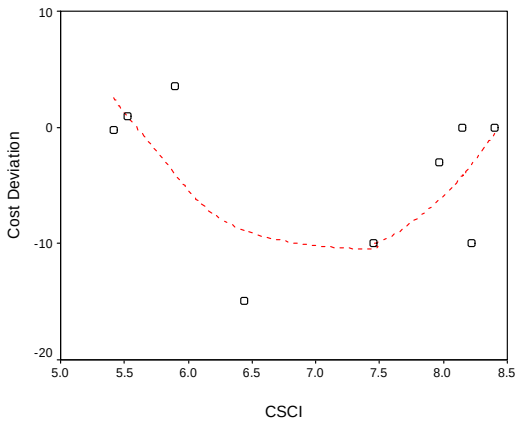
F = 2.49605 Signif F = .1626

---------- Variables in the Equation ----------

| Variable | B | SE B | Beta | T | Sig T |
|---|---|---|---|---|---|
| CSCI | -38.298443 | 17.765842 | -7.461556 | -2.156 | .0745 |
| CSCI**3 | .256172 | .122199 | 7.256031 | 2.096 | .0809 |
| (Constant) | 169.322963 | 79.305041 | | 2.135 | .0767 |

---------- Variables not in the Equation ----------

| Variable | Beta In | Partial | Min Toler | T | Sig T |
|---|---|---|---|---|---|
| CSCI**2 | -5.396876 | -.013137 | 3.234E-06 | -.029 | .9777 |



**Independent Variable SCPPI, Dependent variable.. COSTDEV**
Method.. CUBIC

Listwise Deletion of Missing Data

Multiple R .71630
R Square .51309
Adjusted R Square .35078
Standard Error 5.08351

Analysis of Variance:

| | DF | Sum of Squares | Mean Square |
|---|---|---|---|
| Regression | 2 | 163.38674 | 81.693368 |
| Residuals | 6 | 155.05246 | 25.842077 |

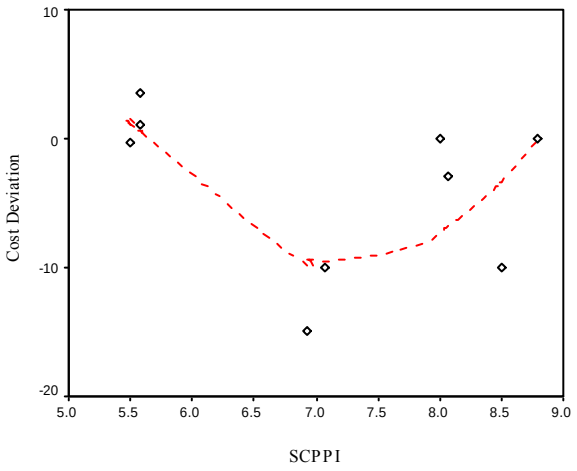
F = 3.16125 Signif F = .1154

---------- Variables in the Equation ----------

| Variable | B | SE B | Beta | T | Sig T |
|---|---|---|---|---|---|
| SCPPI | -54.563663 | 23.363877 | -11.365914 | -2.335 | .0582 |
| SCPPI**2 | 3.782504 | 1.661301 | 11.080947 | 2.277 | .0631 |
| (Constant) | 187.187809 | 79.911277 | | 2.342 | .0577 |

---------- Variables not in the Equation ----------

| Variable | Beta In | Partial | Min Toler | T | Sig T |
|---|---|---|---|---|---|
| SCPPI**3 | -100.124835 | -.516323 | 3.245E-06 | -1.348 | .2355 |



**Independent Variable CSCI, dependent variable.. SCHEDDEV**
Method.. CUBIC

Listwise Deletion of Missing Data

| | |
|---|---|
| Multiple R | .94186 |
| R Square | .88711 |
| Adjusted R Square | .84195 |
| Standard Error | 5.35725 |

Analysis of Variance:

| | DF | Sum of Squares | Mean Square |
|---|---|---|---|
| Regression | 2 | 1127.6389 | 563.81944 |
| Residuals | 5 | 143.5004 | 28.70008 |

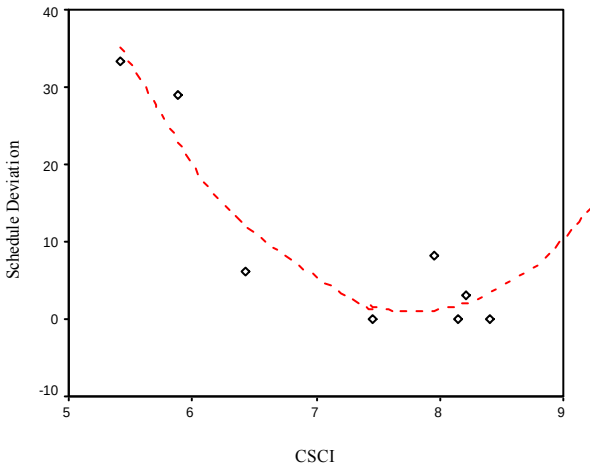
F = 19.64522 Signif F = .0043

---------- Variables in the Equation ----------

| Variable | B | SE B | Beta | T | Sig T |
|---|---|---|---|---|---|
| CSCI | -95.667830 | 36.776714 | -8.260409 | -2.601 | .0482 |
| CSCI**2 | 6.149544 | 2.640941 | 7.394228 | 2.329 | .0673 |
| (Constant) | 373.000714 | 125.054424 | | 2.983 | .0307 |

---------- Variables not in the Equation ----------

| Variable | Beta In | Partial | Min Toler | T | Sig T |
|---|---|---|---|---|---|
| CSCI**3 | -15.485968 | -.180653 | 4.011E-06 | -.367 | .7320 |



**Independent Variable SCPPI, Dependent variable.. SCHEDDEV**
Method.. CUBIC

Listwise Deletion of Missing Data

| | |
|---|---|
| Multiple R | .95910 |
| R Square | .91988 |
| Adjusted R Square | .88783 |
| Standard Error | 4.51328 |

Analysis of Variance:

| | DF | Sum of Squares | Mean Square |
|---|---|---|---|
| Regression | 2 | 1169.2908 | 584.64539 |
| Residuals | 5 | 101.8485 | 20.36970 |

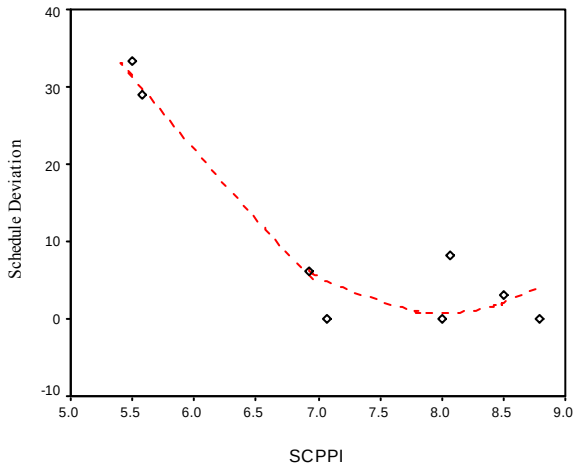
F = 28.70172 Signif F = .0018

---------- Variables in the Equation ----------

| Variable | B | SE B | Beta | T | Sig T |
|---|---|---|---|---|---|
| SCPPI | -79.828822 | 21.370233 | -7.476710 | -3.736 | .0135 |
| SCPPI**2 | 4.999322 | 1.509849 | 6.627316 | 3.311 | .0212 |
| (Constant) | 319.381531 | 73.804051 | | 4.327 | .0075 |

---------- Variables not in the Equation ----------

| Variable | Beta In | Partial | Min Toler | T | Sig T |
|---|---|---|---|---|---|
| SCPPI**3 | -49.542518 | -.691746 | 3.970E-06 | -1.916 | .1279 |



## Glossary

**Alternative Fuels** are alternatives to petrol and diesel and are classified by the U.S. Department of Energy as: biodiesel, electricity, ethanol, hydrogen, methanol, natural gas, propane, and solar.

**Animal Testing** is interventions or treatments on animals for experimental use. This may cause pain, suffering or damage to the animal.

**Audits** are systematic, documented process of objectively obtaining, evaluating and communicating data to determine whether specified activities, events, conditions, management systems or information about these matters conform to a set of criteria (e.g. company standards, applicable legislation).

**BSR** is Business for Social Responsibility, a global partner for responsible business leaders. With more than 1,400 member and affiliated companies worldwide, BSR's mission is to advance leadership in responsible business practices by helping businesses achieve commercial success in ways that respect ethical values, people, communities and the environment.

**Balanced Scorecard** is a corporate strategic control tool. It is also an analysis technique designed to translate an organization's mission statement and overall business strategy into specific, quantifiable goals and to monitor the organization's performance in terms of achieving these goals.

**Benchmarking** is the continuous process of measuring producers, services, and practices against strong competitors or recognized industry leaders. It is an ongoing activity that is intended to improve performance and can be applied to all facets of operation. Benchmarking requires a measurement mechanism so that the performance "gap" can be identified. It focuses on comparing best practices among dissimilar enterprises.

**Biofuels** are defined by the U.S. Department of Energy as: alcohols, ethers, esters, and other chemicals made from cellulosic biomass such as herbaceous and woody plants, agricultural and forestry residues and a large portion of municipal solid and industrial waste.

**Business Units** are organizational units of a company (can range from small teams to large departments) with defined budget and financial targets

**Carbon Sequestration** is a provision of the Kyoto Protocol recognizing the natural ability of the climate system (forests, oceans) to transfer greenhouse gases from the atmosphere to carbon "sinks" or reservoirs

**Chlorofluorocarbons (CFCs)** are compounds consisting of chlorine, fluorine, and carbon. CFCs are very stable in the troposphere, however are broken down by strong ultraviolet light in the stratosphere to release chlorine atoms that deplete the ozone layer. CFCs are commonly used as refrigerants, solvents and foam blowing agents.

International phase-out programs of these chemicals are in place, most importantly the 1987 Montreal Protocol and its subsequent amendments. CFCs are also considered to be greenhouse gases and are targeted for reduction under the 1997 Kyoto Protocol.

**Corporate Citizenship** is management of the totality of relationships between a company and its host communities, locally, nationally and globally. Corporate citizenship is concerned with treating the stakeholders of the firm in a socially responsible manner. The aim of social responsibility is to create higher standards of living, while preserving the profitability of the corporation, for its stakeholders both within and outside the corporation.

**Bribery** is legally defined as paying, soliciting, or receiving a private favor for public action.

**Discrimination** is any distinction, exclusion or preference of persons made on the basis of race, age, sex, sexual orientation, religion, political opinion, social origin, union membership or health condition

**Diversity** is the representation of a range of age, gender, nationality, race and others, across human capital especially in leadership roles.

**Ecosystems** are systems of living species, their abiotic environment and the interaction between them. An ecosystem may encompass a small geographic area such as a pond, or it can be as large as a continent.

**Emission's trading** advocate by the Kyoto Protocol and establishes a mechanism whereby Parties with emissions commitments may trade their emission allowances with other Parties while restricting the aggregate allowable amount of a pollutant. The aim is to improve the overall flexibility and economic efficiency of making emissions cuts.

**Environmental Impact Assessments** are formal processes to predict the environmental consequences of human development activities and to plan appropriate measures to reduce negative effects. The Environmental Impact Statement is a document or report, which contains the result of an EIA study.

**Environmental profit and loss accounting systems** are systems that record and report on the financial implications of environmental policies and measures.

**Fair trade** is an equitable and fair partnership between marketers in North America and producers in Asia, Africa, Latin America, and other parts of the world. A fair trade partnership works to provide low-income artisans and farmers with a living wage for their work.

**Freedom of Association** is the right of all personnel to form and join trade unions of their choice and to bargain collectively (ILO Convention No. 87).

**Green House Gases (GHGs)** are gases that contribute to increasing the insulating properties of the earth's atmosphere. Carbon dioxide (CO2), methane (CH4) and oxides of nitrogen (NOx) are the three main greenhouse gases.

**Green Electricity** is electricity derived from renewable energies only, or combined with electricity generated from non-renewable fuels using efficient technologies such as co-generation

**ILO** (International Labor Organization), created in 1919 after the First World War, with the initial motivation of improving conditions for workers. Headquartered in Geneva, Switzerland.

**ILO Tripartite Declaration of Principles Concerning Multinational Enterprises** and Social Policy, a declaration of the social issues related to the activities of multinational enterprises, adopted by the ILO in 1977

**ISO** is the International Organization for Standardization (ISO) is a worldwide federation of national standards bodies from over 140 countries.

**ISO 14000** is a series of standards on environmental management. ISO 14001 is the standard on Environmental Management Systems

**ICREA** (International Commodity-Related Environmental Agreement) UN induced accord where producers and consumers agree on specific measures to make the

production of a certain export commodity more sustainable. Importing countries accept their co-responsibility for trade-related effects by supplying the funds necessary for the additional costs of more environmentally sound production methods

**Kyoto Protocol** an initiative to commit Parties to legally-binding targets to limit or reduce their GHG emissions. It was adopted at the 3rd Conference of the Parties (COP 3) to the United Nations Framework Convention on Climate Change in December 1997.

**Lost work hours** (changed to DART in 2002) is the number of working hours (consecutive or not) beyond the day of injury or onset of illness, during which the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

**NGOs** are non governmental organizations. Typically refers to non-profit initiatives.

**Near Misses** are accidents that resulted in no major consequence. Similar circumstances may in another case lead to significant damage, injury or fatality.

**OECD** is the Organization for Economic Co-operation and Development. It involves 30 developed countries and headquartered in Paris, France.

**OECD Guidelines for Multinational Enterprises** are recommendations by governments to help ensure that multinational enterprises (MNEs) act in harmony with the policies of countries in which they operate and within societal expectations. The

Guidelines are part of the 1976 OECD Declaration on International Investment and Multinational Enterprises.

**Occupational Illness** is defined as any abnormal condition or disorder - other than one resulting directly from an accident - caused by work-related factors.

**Philanthropy** includes the concept of voluntary action for the public good. It often refers to grants of money given by companies or foundations for a charitable cause

**P3(PRE-PROJECT PLANNING)** is the process of developing sufficient strategic information with which owners can address risk and make decisions to commit resources in order to maximize the potential for a successful project.

**Project System Benchmarking** Identifies organizations with best capital project practices and results and assists in adapting their practices in innovation in ones own organization or project.

**Renewable energies** are produced from regenerative or virtually inexhaustible resources. This includes: hydro; wind; solar; geothermal; bioenergy; tidal; wave; and ocean thermal energy.

**Responsible Care** is the worldwide chemical industry's commitment to continual improvement in all aspects of health, safety and environmental performance; and communicating openly about its activities and achievements. National chemical

industry associations are responsible for the detailed implementation of Responsible Care in their countries.

**RFR** Request for resources. The usual birth point of a capital project in an organization. The early documentation of a market opportunity; it is typically transferred into a corporate physical asset via capital investment.

**Social Impact Assessment** (SIA) is a formal process to predict the social consequences of human development activities and to plan appropriate measures to mitigate negative effects and enhance positive effects.

**Stakeholders** are those groups who affect and/or are affected by the organization or by a capital project venture and its activities. These may include, but are not limited to: employees, customers, shareholders, community and suppliers.

**Stock Option Plans** are defined contribution benefit plans that buys and holds company stock.

**Sustainable development** most commonly accepted definition is the so-called "Brundtland Definition" from the 1987 Brundtland Report, "Our Common Future". Sustainable development is defined here as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**Volatile organic compounds** (VOCs) are substances with a low molecular weight emitted by industrial processes. Common in many household products, such as paint, varnishes and disinfectant materials, some compounds display carcinogenic properties.

**World Business Council for Sustainable Development** (WBCSD) is a coalition of 150 international companies united by a shared commitment to sustainable development. Its members are drawn from 30 countries and more than 20 major industrial sectors. WBCSD aims to provide business leadership as a catalyst for change toward sustainable development and to promote the role of eco-efficiency, innovation and corporate social responsibility

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# Vita

Salwa Mamoun Ahmed Beheiry was born November 26, 1972 in Khartoum, The Sudan, to Dr. Mamoun Beheiry and Mrs. Suad Sayed. Salwa attended The St. Francis Italian Catholic School and The Khartoum International High School (KIHS) before joining The University of Reading in England in 1990. At Reading, Salwa received the Foundation (freshman) year scholarship for best performance in Physics, Economics, and Law (1991) and graduated with a First Class Honours Bachelors of Science Degree in Building Construction and Management in July 1994. In a graduating class of 80 students, Salwa also received the Worshipful Company of Paviours Prize for the student most likely to bring credit to the School of Construction Management and Engineering.

Upon graduation, Salwa joined the Sudan University of Science and Technology as assistant lecturer and also contributed on a part time basis to the planning and construction of several office buildings with a major architectural consultant in Khartoum. In January 1997, Salwa entered the Master of Science in Project Management Program at George Washington University in Washington D.C. and worked under the supervision of Dr. William Wells Jr. until graduation in August 1998. Shortly thereafter, Salwa joined Independent Project Analysis Inc. in Ashburn, Virginia, as a project analyst/consultant, where she developed various skills in project and program evaluation. Salwa stepped down from her consulting role in January 2003 to enter the doctoral program in Construction Engineering and Project Management at the University of Texas at Austin with a clear intent of studying sustainable practices in international oil and petrochemical projects.

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