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A New Conceptual Framework Integrating Environment into Corporate Performance Evaluation

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ABSTRACT
Businesses aim to make profit, but very often they fail to take environmental protection into consideration in the drive to please stakeholders. In this article, a new conceptual framework for evaluating corporate integrated development through the perspective of efficiency (looking at the company's work value created in terms of input–output) is introduced. Under the proposed framework, businesses, investors and society can conveniently understand and evaluate corporate holistic performance including its operational competence, financial health and environmental friendliness. Therefore, decisions of different levels and groups could be made with programmed consideration on this purely analytical ground. Copyright © 2005 John Wiley & Sons, Ltd and ERP Environment.

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Introduction

WITH THE INCREASING AWARENESS OF ENVIRONMENTAL PROBLEMS AND THE DEMAND PLACED BY industrial activities on environmental quality, the control of pollution has become more important for companies than ever. Increasingly protective environmental legislation with an emphasis on conservation and sustainability of our resources is being introduced in most parts of the world. With this trend of global consciousness and behavior to achieve a cleaner earth, the pressure on industries to improve their production processes is tightened accordingly. As a result, enterprises must rethink, and may even have to change their applications completely if the global economy is to become sustainable.

The solution might lie in the cooperation of public and private sectors. Since the private sector will continue to be the major driving force of economic growth, it must take responsibility to implement sustainable practices by becoming more efficient. Furthermore, it is vital to involve a wider spectrum of interest groups in a country's economic planning. Enterprises, investors and society must work

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together to establish and maintain a transparent and efficient market, revealing not only a company's financial performance but also its operational and environmental achievement. Regarding investors, the more they know about a company, the greater their scope of investment choices. In other words, the reporting system has to have an impact on a company's overall performance.

Nowadays, at the beginning of the 21st century, although we are proud of our advanced technology and modern commerce, the conflict between business profitability and social welfare, a hangover from the last century, has not improved, and in some aspects is even worse. Our reporting systems for companies' activities are not transparent enough for outsiders to monitor the companies and make their investment decisions accordingly. In the future, the lack of transparency will impede us from re-engineering enterprises, which may result in making forecasts that are far too optimistic. Besides, the near-sighted attitude that ecological innovation is an expense that erodes profit gain will block the progress. Therefore, we need to make more effort to improve the information transparency through a holistic view in order to enhance the link between economic development and environmental sustainability. With many international organizations now adopting foresighted environmental, economic and social information programs, it seems that the time to implement a long term, holistic approach to corporate-level issues of integrated development is fast approaching.

WBCSD proposed the concept of 'eco-efficiency,' which unites economic and environmental issues. The eco-efficiency formula is represented by dividing product or service value over environmental influence (value per environmental influence). The International Standards Organization (ISO) recommended that an International Standard on Environmental Performance Evaluation (ISO14031) be used to evaluate a corporation's effect on the environment. ISO 14031 can identify relevant trends in a corporation's activity and thus can provide the management with reliable and verifiable information regarding the company's environmental impact.

It is often assumed that environmental and economic considerations cannot be accommodated in a profit driven company's planning. This is because environmental expenditure is often treated as a corporate expenditure. Therefore, this socially aware consideration is usually ignored. In our belief, this kind of emission is actually inefficient, and an improvement in environmental issues leads to a general upgrade in efficiency. Based on eco-efficiency and ISO14031, this study aims to establish an evaluation for environmental protection and corporate profitability from the angle of efficiency. However, we realize that any evaluation system will only be effective if the information provided is user friendly. Here, users are defined not only as internal business managers, but also as investors, insurers, consumers and other interest groups.

This work will provide fresh insight into introducing a new framework for the evaluation of corporate integrated development and illustrating its application. There are three sections besides this introductory section. In the following section, we describe the communication challenge of biased information that inspired the new framework. Subsequently, the concept of efficiency is provided and the framework for corporate integrated development is introduced. We then discuss future applications to make our framework practical. Finally, the concluding remark is provided in the last section.

The Communication Challenge

It is undeniable that in the short run there is a deep-rooted trade-off between the environment and economy for most enterprises. On one side of the trade-off is the demand of environmental soundness arising from stringent regulation, while on the other we see industry fighting for competitiveness and desperately pursuing a 'cheap at all costs' policy. With the argument framed this way, progress on environmental quality is like an arm-wrestling match. One side pushes for tougher standards; the other tries

to roll them back (Porter and Linde, 1995). This kind of conflict is caused by various information barriers including personnel, agent isolation, cost, geographical, dissemination and technical language (Alabaster and Hawthorne, 1999). The communication barriers among different groups are the major causes of conflict between duty and desire.

The possible sources of biases, including the availability of information, selective perception and concrete information (Warner, 1997), which clogs communication, are further discussed below.

Availability of Information

People tend to pay attention to information that is readily available. Some stakeholders, including banks or communities, are very concerned that industry may be harmful to the environment. They make plans and decisions based mostly upon government. However, this well published or frequently occurring data gathered according to a government's specific purpose may not be adequate or suitable for their particular needs.

Selective Perception

People tend to face problems from the perception of their specific group or cultural affinity. The information is then interpreted through tinted glasses: it is distorted. This functionally biased perception results in communication inefficiency. In Figure 1, it can be observed that different groups weight higher the information on their specific function and interest. While individual companies pay more attention to their machines' or employees' work performance, investors tend to focus on business financial performance. Social groups emphasize the living environment, thus a company's environmental performance is the most important aspect to them. More or less, the groups seem to be in opposition, showing

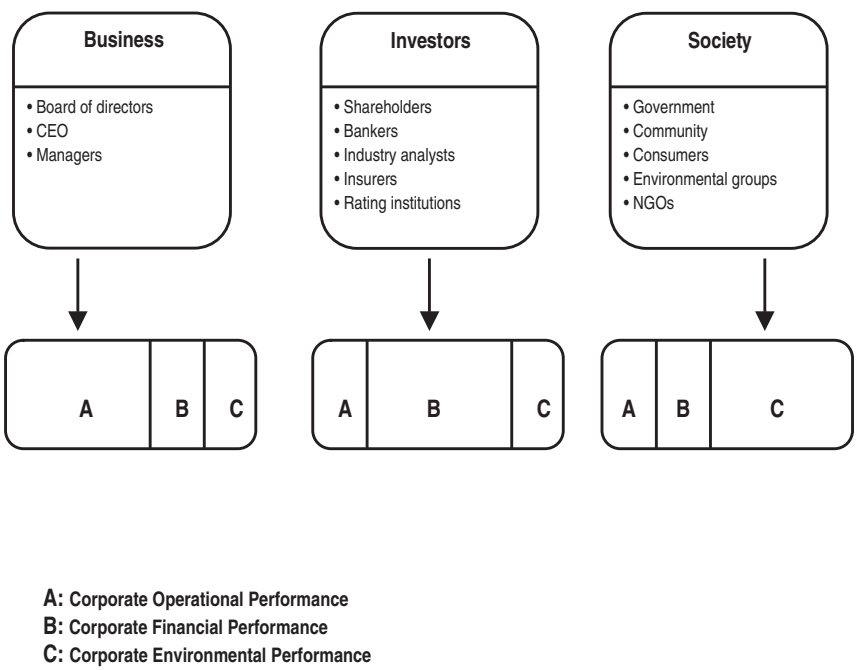

Figure 1. Bias in information use caused by selective perception

little or no interest in the information not under their sphere of interest. For instance, the financial sector has been very slow to come to terms with the concept of corporate operational and environmental performance, due to the traditional resistance towards environmental matters and the inability to understand the relationship between financial earnings and the environment (Cooper, 1999). As to community, the insistence on holy environmentalism often disregards the reality of peoples' needs for economic prosperity. Furthermore, the goals and rewards of particular groups cause them to perceive and interpret information in ways that suit and reinforce their functional thoughts.

Concrete Information

A decision that is supported by verifiable and logical information is more effective than a decision supported by ambiguous and subjective information. Although the disclosure of corporate environmental reports (CERs) is widely advocated, most reports do not fulfill the needs of corporate integrated information to their stakeholders. Environmental information is plentiful, but is not easily accessed nor readily sought. And when it is, it is often nebulous, scattered, overly technical and biased (Jeffers, 1995). As long as the need for objective, clear and verifiable information is not satisfied, the gap between economy and ecology will become deeper and communication problems will deteriorate.

Corporate integrated development is a view constituting a firm's holistic performance of operational competence, financial health and environmental friendliness. The aforementioned information gaps and communication problems could only be resolved through a holistic approach. The three main groups should search for a common ground, namely the 'one-stop' reporting system. Information should be put into a format that investors, society and firms could access to evaluate corporate operational, financial and environmental performance more accurately and more efficiently. Through an integrated evaluation approach, there is great potential for investors and communities to influence the way business operates. Moreover, the changing investment patterns and the reasonable negotiation approaches can be a facilitator for the evolution of a sustainable business cycle.

Evaluation Framework

While many stakeholders see environmental reporting as increasingly important for investment, consumption and other related decisions, the information provided in annual reports falls short of their expectations (Fayers, 1999). For that reason, until there is wide availability of transparent, objective and comparable information presented in an integrated manner, the problem of information asymmetry will continue to exist and the contradiction will remain.

A document that features economic, social and environmental information but does not take any interrelationships into account is not considered to be integrative (Shearlock *et al.*, 2000). Therefore, information should be collected in a systematic way. Properly designed evaluation standards can help policy-makers set industrial upgrading laws, prompt industry restructuring and trigger the business leaders' logic of process regeneration and product innovation that reduce the total cost and enhance the total value. The appropriate dimensions in terms of managerial and potential application to assess corporate total performance are discussed in this section.

Four Types of Capital

Since the advent of the industrial revolution, capital for manufacturing such as financial resources, factories and equipment has become the major input in industrial production. Natural capital, on the other

hand, is considered as only a marginal input and has largely been ignored. For a long time, natural capital has been thought to be irrelevant to an enterprise's business planning, even though natural capital cannot be produced solely by human activities.

According to *Natural Capitalism* (Hawken *et al.*, 2000) the traditional definition of capital is accumulated wealth in the form of investments, factories and equipment. An economy requires four types of capital, namely human capital, financial capital, manufactured capital and natural capital, to function efficiently. Human capital is usually expressed in the form of labor and intelligence, culture and organization. Financial capital consists of cash, investments and monetary instruments. Manufactured capital includes infrastructure, machines, tools and factories. Natural capital is made up of our resources, living systems and ecosystem services. These four types of capital are not mutually exclusive. Our industries use human, financial, manufactured and transferred natural capital to create the goods that are in common daily use.

Efficiency

We believe that integrated development for business is not a fixed goal, but a process. Therefore, strategies of corporate integrated development initiatives questions are not based on morality but on efficiency. Efficiency deals with measuring the performance of firms, which convert inputs into outputs. In managerial application, a firm's micro-level data is used for making performance comparisons at higher levels of aggregation.

The concept of efficiency opens up a new way of looking at the company's work value created in terms of input–output. Through the perspective of efficiency, companies must pursue their manufacturing reengineering in a resource efficient manner that will benefit not only themselves but also all society. Efficient allocation of capital that reflects all input factors should be a major concern of stakeholders for both their present demand and future interest.

Framework

To higher-level managers, investors and society, the evaluation of a facility's environmental protection activities is emphasized on its total environmental impact, rather than the measurement of certain chemical output. To the same way, evaluation of a company's overall development should be concerned with the total performance to make good use of every type of resource, including materials, facilities and financial assets, rather than certain material consumption or a certain accounting expense. Decisions must be made on pragmatic considerations as well as on pure analytical grounds.

Evaluation for overall development requires the integration of a firm's three basic abilities: operational, financial and environmental management competence, as shown in Figure 2. However, the level of competence cannot be easily observed. Its ambiguous nature must be clarified to enhance our understanding of corporate behavior. Through a systematic view, the procedure of input–process–output–feedback, our problems could be resolved. The four types of resource, human, financial, manufactured and natural capitals, that we have discussed in the last section are the corporate inputs. Through business activities, both desirable outputs and undesirable outputs are produced. Desirable outputs could be roughly categorized into real goods such as products and services, and financial gains such as earnings before interest and expense (EBIT). Undesirable outputs are usually pollutions such as emissions, wastes and noise. Feedback can be obtained from many output/input ratios. These ratios are the interpretation of firms' three categorized performances: operational, financial and environmental performances that are accessible to all interest groups.

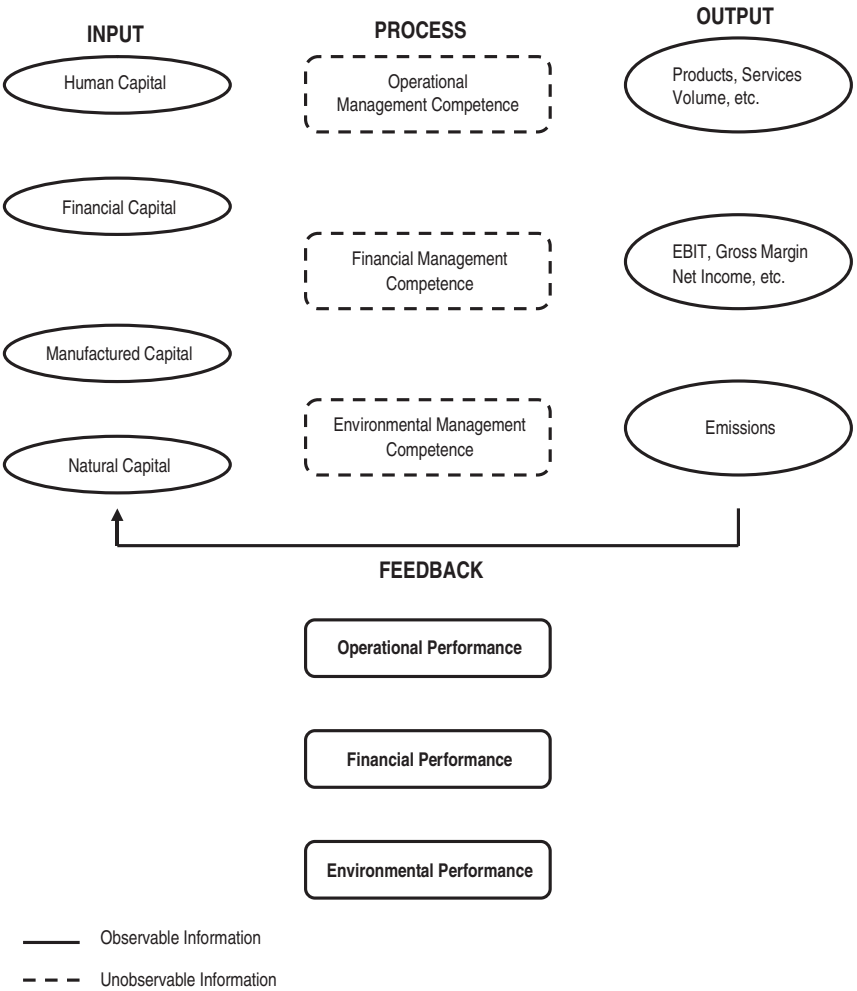

Figure 2. The framework for evaluation of corporate integrated development

With this framework, we would be in a better position to understand the complex links between firms' operational, financial and environmental performance. Relevant policies could then be adopted accordingly. However, it is worth noticing that these efficiency measures can provide a misleading indication of overall productivity when considered in isolation. Banks, shareholders, fund managers and rating agencies need to take the firms' other performances into investment consideration, so that financial capital allocations can be properly allocated without accounting for the loss of natural and human capital. These institutions hopefully would have a financial system with all values in place, and where nothing is marginalized or externalized. To date, social or biological values have not fitted into today's accounting procedures. Information disclosure in the manner of this suggested framework could be provided for references of green accounting and environmental tax reform. This framework is also helpful to the business itself. Companies will look for a balance between revenue and responsibility. They will avoid the disasters caused by narrowly focused eco-efficiency for the environment by overwhelming resource savings and by manufacturing larger inappropriate products produced by the incorrect process.

Companies that are moving toward advanced efficiency use of their resources will also discover an unexpected consequence to their allocations. They save energy and money, create competitive advantage and help restore the environment, and they will gain the reputation of 'being a good citizen' into the bargain. To the public, this means that they not only maintain a balance between workers and resource-fed machines, but also create a renewed sense of purpose and mission that is good for our younger generation.

Indicator Example

Companies, investors and society will require integrated information on a wide range of indicators to monitor and evaluate a firm's performance. Having discussed the framework of corporate integrated development, we will give some indicator examples. Financial analysis rating of a company's performance based on traditional criteria as well as on an environmental impact derived from the eco-efficiency approach pioneered by the WBCSD is used. More detailed input and output data for future indicators are summarized in Tables 1 and 2. The indicator examples for each category are given below:

Operational performance is taken from classical microeconomics concerning total factor productivity. Productivity of labor and manufacturing capital are usually discussed. Examples for operational performance are as follows.

Capital type	Indicator example	Unit	Data source
Human capital	• Number of employees	People	Financial reports
	• Number of middle level managers	People	Financial reports
	• Total labor hours	Hours	Financial reports
Manufactured capital	• Number of machines	Machines	Industry union, company
	• Factory space	Square meters	Industry union, company
Financial capital	• Short-term debt	Dollars	Financial reports
	• Long-term debt	Dollars	Financial reports
	• Insurance expense	Dollars	Financial reports
	• Equity of common shareholders	Dollars	Financial reports
Natural capital	Energy consumption		
	• Electricity	Gigajoules	Industry union
	• Coal	Gigajoules	Industry union
	• Natural gas	Gigajoules	Industry union
	• Fuel oil	Gigajoules	Industry union
	Materials consumption		
	• Raw materials	Tons	Industry union
	• Other process materials	Tons	Industry union
	• Pre- or semi-manufactured parts	Tons	Industry union
	Natural resource consumption		
	• Water	Tons	Industry union
	• Wood	Tons	Industry union
	• Mineral	Tons	Industry union
	• Land use	Hectares	Industry union

Table 1. Indicator examples of input data
Source: some indicator examples are adapted from *Measuring Eco-Efficiency: a Guide to Reporting Company Performance* (WBCSD, 2002).

Output type	Indicator example	Unit	Data source
Desirable outputs			
Product & service	• Volume	Units sold or kilograms	Industry union, company
	• Output value	Dollars	Financial reports
Financial output	• EBIT	Dollars	Financial reports
	• Gross margin	Dollars	Financial reports
	• EPS		Financial reports
Undesirable outputs			
Emissions	GHG emissions	Tons of CO_2 equivalents	
	• CO_2, PFC_S, NF_3, CF_4, C_2F_6, SF_3, C_3F_8		EPA reports
	ODS emissions	Tons of CFC_{11} equivalents	&
	• CFC_S, $HCFC_S$		Waste disposal reports
	VOC	Kilograms	&
	• THC		Estimation or calculation
	Acidification emissions	Kilograms	
	• NO_x, SO_x, HF, HCL, H_2SO_4		
	Waste water		
	• Waste water emission	Tons	
	• pH value		
	• COD	Tons	
	• BOD	Kilograms	
	Priority heavy metals (PHM)	Tons of Cu equivalents	
	• As, Cd, Cr, Cu, Pb, Hg, Ni, Zn		
Others	Wastes	Tons	
	Noise	Decibels	

Table 2. Indicator examples of output data
Source: some indicator examples are adapted from *Measuring Eco-Efficiency: a Guide to Reporting Company Performance* (WBCSD, 2002).

Output value created per employee (output value/number of employees)

Output value created per machine (output value/number of machines)

Financial performance is extracted from financial ratios in annual financial statements. Commonly used financial ratios can be categorized into five kinds: leverage ratios, liquidity ratios, efficiency ratios, profitability ratios and market-value ratios. Appropriate ratios related to the purport of this study are presented below.

Asset turnover (sales/total assets)

Net profit margin (earnings before interest and tax/sales)

Return on assets (net income/total assets)

Return on equity (net income/total equity)

Environmental performance can be divided into two types. One is corporate ability to efficiently transform natural resources into desirable outputs, and the other is corporate environmental preventive behavior to effectively cope with their undesirable outputs. Some indicator examples from WBCSD's pioneering research include

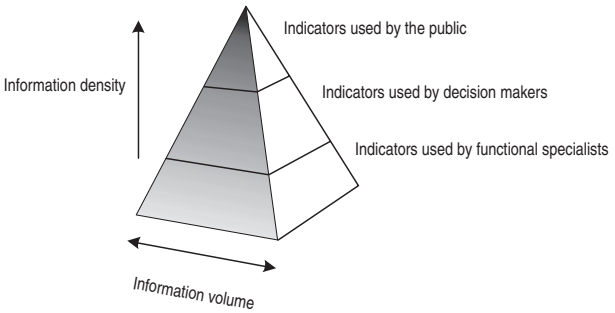

Figure 3. Indicator pyramid

Material consumption efficiency (tons of material/units of sales)

Energy intensity (Giga-joules/units of sales)

GHG emissions (tons of GHG emissions/units of sales)

Waste water emissions (tons of waste water/units of sales)

Indicator Pyramid

Indicators, such as those discussed, could be employed to assess the condition of a given company to provide an early warning signal of changes in the environment, and to diagnose the cause of a problem. Indicators for business operations, in particular, need to capture the complexities of the system, yet remain simple enough to be easily and routinely monitored.

While the interpretation of data is subject to the users' background, the basic constructing principles of an indicator should be established and commonly agreed upon by all information users. Indicators used by different levels of users are quite distinct from information volume and information density as shown in Figure 3. For example, a production line manager may focus on very detailed information of processing, whereas a financial department manager may be concerned with the details of expenditure. However, a CEO just needs the summarized information gathered from different departments. Therefore, in this pyramid, indicators used in the same levels are for the purpose of communication, whereas indicators provided by the lower levels to the upper ones should be less complex and therefore more easily understandable and in smaller numbers.

Managerial decisions should be based on broad consensus and support. However, in the real world, decision-makers of higher levels in the company often have highly incomplete information, and limited time and scope of attention. In order to provide a sound basis for decision-making, they have to be informed with general, indicative, sensitive, robust and inter-linkage indicators, permitting them to proceed towards total efficiency.

Applications

The introduced evaluation framework for corporate integrated development can be beneficial for our society in the following ways.

To End Conflict

For a long time, the environmental debate has been conducted in an endless cycle. Scientists find another negative human activity that may be harmful to the environment. The business refutes the impact, the community contends for living rights and the media reports both sides. The issue eventually joins the end of a growing list of unresolved problems, and our society becomes paralysed. The point is not that one side is right and the other side is wrong, but that both sides are not well informed. It is suggested that the reporting system be constructed with the information available in a clear and understandable way. This means that communication barriers need to be removed and the relationship between business and the environment strengthened.

To Improve Transparency

The development of an integrated development system will also contribute to greater corporate transparency and the subsequent re-allocation of capital. This system will enable an organization to monitor and measure its environmental performance in addition to its operational and financial performance. More and more companies will find it increasingly easy to communicate the results to stakeholders. Moreover, reporting is more than records of events that have just happened; it can be a yardstick for future actions. It is the question of what information should be reported and analysed in order to get the company to enhance its performance according to the indicator pyramid. With the proper indicators, all interest groups can determine the extent of corporate development and put pressure on corporations to improve their holistic performance.

In addition, the Internet provides opportunities for accessing information and joining in the decision-making process. Corporate performance could be shown, either voluntarily or through legislation, as on-line information. The Internet service can help accelerate corporate transparency, in both the environmental and financial aspects.

To Predict Industry Restructure

Through the proposed framework, one can easily identify whether an industry is labor or energy intensive. For the newly industrialized countries, the indicators provided can help the government to set a correct industrial policy: for example, when and to what extent to provide subsidies or tax incentives to certain industry. Also, those industries with poor environmental records will naturally be eliminated from the pressure of information disclosure. Changed investment patterns can make a significant contribution towards achieving a sustainable economy from financial prospects. Companies that value the sustainability concepts and are proactive to allocate capitals efficiently will be competitive and give greater priority to public awareness and stricter environmental protection laws in the next decade.

To Advance Ecological Innovation

Ecological innovation includes the development and implementation of new products, new markets and new systems (Blättel-Mink, 1998). In the past, ecological innovation has been thought to be costly in monetary terms rather than its internal and external created utilities. However, there is evidence that a normative conflict of objectives between economy and ecology does not exist in ecologically innovative companies (Blättel-Mink, 1998) that combine innovations in business practice and in public policies. Once the evaluation system introduced in this paper is established, companies may be inspired to become ecologically innovative, and those companies that are dynamic and innovative will survive and

eventually become the winners if the integration of economy and ecology becomes a key factor of competition.

Conclusions

This paper combines corporate operational, financial and environmental performance in a systematic way. The results could be used as a base for the development of a comprehensive corporate integrated evaluation system. However, the reason for introducing this framework is not to create more indicators. On the contrary, we plan to use the internationally recognized evaluation systems to establish a level playing field for pro-business and pro-environment interests.

Ultimately, the objective of corporate existence is profitability rather than cost saving. The cost concept should be reviewed by the injection of environmental concern and holistic consideration. The struggle between short-term cost declining and long-term profit rising can be relieved by seeing things from a broader prospective. Before everybody learns to think long term, some legislation forcing business to disclosure its overall performance cannot be avoided. After all, the old cliché that 'we just have one earth' is so real and urgent it cannot be ignored.

For decades, environmental issues have been swept under the carpet in our race to build commercial empires. Traditional business management sees environmental issues as a one sided argument promoted by ecologists and environmentalists. However, no one, not even management, can deny that our resources are being exhausted due to our inefficient and ignorant use. Although corporate integrated development is generally considered costly and impractical, if introduced in the way presented in this article we believe that it can become an integral part of the way business is done. Charles Handy (1997) stated

> The great excitement of the future is that we can shape it.

The bridge linking business and the environment is to search for a common interest and to build on that common ground. The framework for corporate integrated evaluation is a game worth playing. Through it, a well informed public and a responsible corporate community can work in partnership to restore and protect our precious natural heritage.

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Biography

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