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Organizational Sustainability: A New Project Portfolio Management Approach that Integrates Financial and Non-Financial Performance Measures

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Abstract

This paper presents preliminary research on a new decision making tool that integrates financial and non-financial performance measures in project portfolio management via the Triple Bottom Line (TBL) and uses the Analytic Hierarchy Process (AHP) as a decision support model. This new tool evaluates and prioritizes a set of projects and creates a balanced project portfolio based upon the perspectives and priorities of decision makers. It can assist decision makers with developing and making proactive decisions which support the strategy of their organization with respect to financial, environmental and social issues, ensuring the sustainability of their organization in the future.

Keywords
Financial vs. non-financial performance measures, organizational sustainability, triple bottom line (TBL), analytic hierarchy process (AHP), project portfolio management

1. Introduction

Organizational sustainability, which is defined as building and maintaining the long-term satisfaction of stakeholders, is one of the major concerns of policy makers, and corporate and engineering managers in today's competitive, complex and dynamic business environment. Although sustainable development practices seem to be inconsistent with the short-term financial goals of an organization, it becomes apparent that they are essential practices when the long-term financial success and satisfaction of the stakeholders of the organization are considered. For instance, a study conducted by Switzerland's Bank Sarasin [1] in 2002 showed that the fluctuation in share prices of companies that adopt environmentally and socially compatible business practices is lower than the fluctuation in share prices of other companies in the same industry. In addition, recent environmental problems such as global warming and the increased awareness of society with regard to environmental and social issues compel the policy makers, and corporate and engineering managers to implement sustainable development practices in their organizations. However, one of the biggest barriers in adopting the sustainable practices in the business environment is the lack of a single and overarching management tool that will combine the three dimensions of sustainability - economic prosperity, environmental quality and social justice - with the organization's overall strategy. As opposed to the conventional management approaches, organizational sustainability management requires the integration of both financial aspects and non-financial strategic success factors, including environmental and social, into the management system of a company. For this reason, the basic motivation behind this research is to satisfy the need of a management tool that will assist decision makers with developing and making proactive decisions, which will support the strategy of their organization with respect to financial, environmental and social issues, ensuring the sustainability of their organization. With this aim, a new project portfolio management tool that integrates both the financial and non-financial performance measures including environmental and social, via the Triple Bottom Line (TBL) framework is proposed because the project portfolio management plays a critical role in aligning an organization with its strategic objectives. This paper first presents a brief literature review of the major organizational sustainability management tools. Then, the TBL framework, AHP methodology and basic assumptions behind the construction and development of the model are discussed. Finally, the model is demonstrated, and main conclusions and future research directions are discussed.

2. Literature Review

The literature review analyzes the development of management tools for organizational sustainability from an evolutionary perspective. As a natural result, it refers to the relationships and intersection points of several fields such as performance measurement, cost management and accounting systems, strategic management, and organizational sustainability.

2.1 Performance Measurement and Cost Management for Organizational Sustainability

Without accurate and comprehensive information, it would be impossible for decision makers to make correct and rational decisions for the future of their organizations. Therefore, measuring with a high level of accuracy all costs and benefits of all types of organizational activities is one of the most desirable aspects that are expected from an effective management tool. However, in today's competitive and complex business environment, most of the traditional management tools are inadequate and lack this sensitivity because they are built on financially-driven performance measurement systems. For this reason, incorporating non-financial aspects in addition to financial aspects into the management process is a necessary action in order to build and maintain the sustainability of an organization.

Researchers note that the concept of non-financial performance measures is not a new phenomenon; General Electric was using non-financial performance measures in 1950s [2]. Also, a number of theorists have pointed to the importance of non-financial performance measures [2]. For instance, in 1995 Thor [3] not only explains the need for a family of performance measures to evaluate an organization's performance, but also proposes a methodology to create a family of performance measures as well as arrive at the optimal number and type of performance measures in a family. However, prior to 1992, no management tool that integrated both the financial and non-financial performance measures existed. In 1992, Kaplan and Norton [4] proposed the Balanced Scorecard (BSC) as a management tool that considers both the financial and non-financial performance measures in the translation of organizational strategy into action. The BSC has four perspectives - financial, customer, internal business, and innovation and learning. These four perspectives enable a connection between organizational strategy and operational activities. Moreover, in the 1980s, as a result of environmental problems and increased awareness of society on environmental and social issues, environmental and social performance measures began to be considered under the non-financial performance measures. These measures typically focus on external costs, which are costs imposed by an entity as a by-product of its economic activity on third parties, such as households [5]. These concepts were then extended by other scholars. For example, in order to improve the environmental accounting and reporting practices, Atkinson [5] proposed in 1995 a full cost accounting system which takes into account external costs. In addition, after the publication of John Elkington's book *Cannibals with Forks: The Triple Bottom Line for the 21st Century Business* [6] in 1997, the Triple Bottom Line (TBL) accounting system became popular. In general, the TBL framework is based on the three dimensions of sustainability – economic prosperity, environmental quality and social justice.

2.2 Management Tools for Organizational Sustainability

All of the developments previously mentioned (including the usage of non-financial performance measures in management, considerations of environmental and social costs, developments of full cost accounting and TBL accounting systems) have stimulated researchers to consider a comprehensive management tool for organizational sustainability. For instance, in 2002 Figge et al. [7] proposed the Sustainability Balanced Scorecard (SBSC) by considering the Balanced Scorecard (BSC) as a starting-point to incorporate the environmental and social aspects into the management system of an organization. Additionally, in 2007 Wang and Lin [8] presented a quantitative model that makes use of the TBL accounting mechanism. As a decision support tool, Wang and Lin [8] proposed a sustainability optimization model which incorporates the environmental and social costs and values into economic activities.

In sum, as it is seen in the literature, the development of a management tool for organizational sustainability involves many different domains such as performance measurement, cost management and accounting systems, strategic management, environmental quality, social justice, etc., requiring an integrated approach to model and analyze this important area.

3. Methodology

This section addresses the construction and development process of the proposed model. First, a brief summary of Elkington's Triple Bottom Line (TBL) framework and its extensions are presented. Then, the Analytical Hierarchy Process (AHP) methodology and its advantages are discussed as a multi-criteria decision making support tool. Finally, the basic assumptions behind the proposed model are given, and an example application of the proposed model using the U.S. electric utility industry is demonstrated.

3.1 Triple Bottom Line and Sustainability Index System

The Triple Bottom Line (TBL) approach was developed by John Elkington [6] in the 1980s as a platform to report and measure organizational performance with respect to the three dimensions of sustainability – economic prosperity, environmental quality and social justice. By reporting and measuring not only financial performance but also the performance of environmental and social dimensions of sustainability, TBL helps to build and maintain the satisfaction of stakeholders, including shareholders, employees, customers, suppliers, and non-governmental organizations (NGO's). The TBL concept established its reputation with the publication of Elkington's book, *Cannibals with Forks: The Triple Bottom Line of 21st Century Business* [6], in 1997. In recent years, the concept has rapidly increased in popularity. For instance, the phrase "Triple Bottom Line" occurs in 67 articles in the *Financial Times* in the years preceding June 2002 [9]. Many companies have used TBL terminology in their press releases, annual reports and other documents [9]. For this reason, in order to integrate both financial and non-financial performance measures into the project portfolio management, the TBL sustainability index system developed by Wang and Lin [8] is used in this research project. Wang and Lin's [8] TBL sustainability index system provides an individual index set not only for the three dimensions of sustainability - economic prosperity, environmental quality and social justice - but also for the intersecting areas of these three main dimensions, namely eco-environmental, eco-social, socio-environmental and eco-socio-environmental. A visual representation of the TBL sustainability index system is depicted in Figure 1. To learn more about the specific indices defined by Wang and Lin, please see the paper listed in the References section.

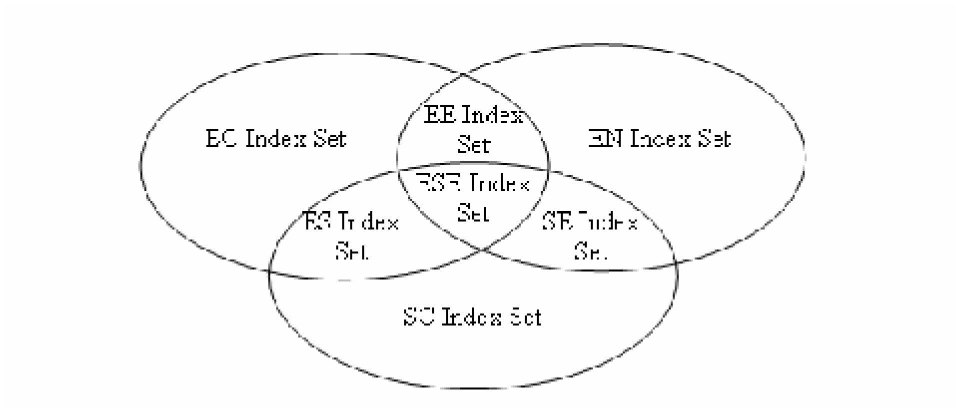

Figure 1: Triple Bottom Line Framework and Sustainability Index System
(EC: Economic, EN: Environmental, SC: Social, EE: Eco-Environmental, ES: Eco-Social, SE: Socio-Environmental, ESE: Eco-Socio-Environmental) [8]

3.2 Analytic Hierarchy Process (AHP) Methodology

The Analytic Hierarchy Process (AHP) was first introduced by Thomas L. Saaty [11] in 1980 as a mathematical based decision support tool. In general terms, AHP provides a framework that helps to model and solve multi-criteria decision problems. The AHP methodology has four basic steps: problem structuring, criteria and alternative prioritization, calculation of ranks and sensitivity analysis.

1 - Problem Structuring: As a first step, the multi-criteria decision problem is framed in a hierarchical structure. The objective is placed at the top of the hierarchy, and the criteria, sub-criteria and alternatives are located on respective lower levels of the hierarchy. Neither interaction nor dependency among and between the levels of this hierarchical structure is assumed.

2 - Criteria and Alternative Prioritization: In the second step, the decision maker assigns relative weights by performing pairwise comparisons at each level of the hierarchy with respect to an immediate upper level attribute. These weights are assigned to all criteria, sub-criteria and alternatives. When assigning relative weights, an integer scale from one to nine is used where one represents no difference between the compared objects and nine represents that one object is significantly more important or dominant than the other object [12]. The criteria and alternative prioritization process is redundant, leading to multiple comparisons of the same objects. Through the calculation of an inconsistency ratio, decision makers use the redundancy while performing pairwise comparisons to prevent making poor judgments. Saaty [12] recommends that an acceptable inconsistency ratio should be less than or equal to 0.1. In general, a consistency ratio is calculated to ensure consistent input and pairwise comparisons from the decision maker. Keeping the ratio below 0.1 prevents the decision maker from contradicting him/herself. In this illustration, all consistency ratios fell below the threshold.

3 - Calculation of Ranks: In this step, all assigned relative weights are aggregated throughout the hierarchy, and overall weights of each alternative are calculated. The calculated overall weight for each alternative represents its final priority and rank among the other alternatives.

4 - Sensitivity Analysis: As a final step, a sensitivity analysis is performed in order to determine how the final rankings are affected by changes in the judgments throughout the process.

AHP is used in this paper as a decision support tool because of its certain characteristics and advantages. For example, AHP is practical and unsophisticated. It simplifies handling real life complex problems because it provides a formal structure to describe a problem as well as a solution procedure composed of simple calculations. Secondly, AHP is intuitive because it synthesizes the judgments that reflect both the decision maker's knowledge and emotions and incorporates both qualitative and quantitative aspects into the decision making process. Thirdly, AHP uses the prioritization process to build consensus among multiple decision makers. And finally, user friendly commercial AHP/ANP software packages such as Expert Choice [13] and SuperDecisions [14] are readily available. (ANP, Analytic Network Process, is a more general form of AHP. It differs from AHP in that it generalizes the pairwise comparison process so that decision models can be built as complex networks with the interconnecting components.)

3.3 Proposed Model and Demonstration

The AHP model is demonstrated and tested using the U.S. electric utility industry. This industry was chosen because applying sustainability metrics and practices to the energy utilities is a relatively innovative concept. A 2002 PriceWaterhouseCoopers (PWC) survey [15] found that only five out of nine surveyed energy companies in the U.S. have defined sustainability, even though the industry is closely tied to environmental and economic issues. In that sense, this research aims to minimize the gap between the theory and practice, and make a contribution from both academic and business perspectives. The construction and development process of the proposed model and solution procedure are summarized in the following parts based on the four basic steps of the AHP methodology.

1 - Problem Structuring: SuperDecisions [14], an AHP/ANP software package commonly used by decision makers, is used to construct and analyze the case. The TBL sustainability index system developed by Wang and Lin [8] and presented in Figure 1 is used to identify the attributes for the model. Five project areas based on current industry trends and issues are selected as alternatives. These areas are described in detail in Table 1. Governmental concerns for the future of energy in the U.S. drive the need for future capacity and green power projects. Emissions control allowances are related to considerations of global climate change. Financial measures and performance are always a concern for a commodity-based company that is part the utility stock index, a group of historically strong and stable performers. Finally, the aging workforce in the industry is a problem for all utilities; and reports estimate that 11-50% of the workforce is eligible to retire in the next five to ten years [16]. Therefore, in general the AHP model reflects the current situation of the U.S. electric utility industry.

Table 1: Common issues in the U.S. electric utility industry and the related project alternatives

Major Issues in the U.S. Electric Utility Industry	**Names and Codes of Related Project Alternatives**
Future Capacity Concerns	Capacity Expansion Project (CEP)
Absence of Green Power	Green Power Applications Project (GPAP)
Emissions Control and Allowances	Emissions Control Project (ECP)
Continued Financial Performance	Financial Performance Improvement Project (FPIP)
Aging Workforce	Workforce Refreshment Project (WRP)

2 - Criteria and Alternative Prioritization: Knowledge and experience gained from working in the electric utility industry is utilized in demonstrating the model. The criteria, sub-criteria, attributes and alternatives are prioritized by considering the behavior and perspective of a typical decision maker and current trends in the U.S. electric utility industry.

3 - Calculation of Ranks and Results: After running the constructed AHP model in SuperDecisions [14], projects related to the aging workforce are chosen as the most important alternative with respect to the TBL sustainability index system. This aligns with the current U.S. electric utility industry issues - if companies do not replace retiring workers, services and performance will suffer. In particular energy companies and investor-owned utilities cite aging workforce as their number three overall concern, while municipals cite it as their number one concern [17]. Additionally, the analysis ranks financial performance second, green power initiatives third, future capacity fourth, and emissions control fifth.

4 - Sensitivity Analysis: Finally, in order to demonstrate the sensitivity of the final ranking results with respect to the changes in the judgments throughout the prioritization process, an example sensitivity analysis is performed. The related SuperDecisions [14] diagram is presented in Figure 2.

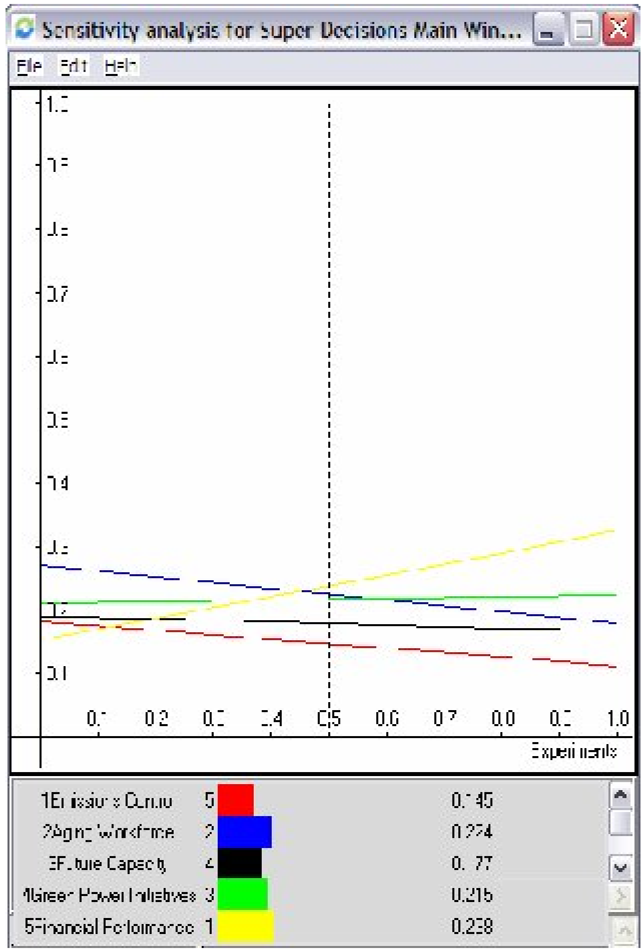

Figure 2: Sensitivity Analysis for Changes in the Weight of Economic Prosperity Criteria

As it is seen, the ranking of Financial Performance Improvement Project (represented by the increasing line) increases while the weight of Economic Prosperity Criteria increases.

4. Conclusion

A project portfolio management tool that can be used by the policy makers, and corporate and engineering managers while managing the sustainability of their organizations is presented. By using the AHP methodology and incorporating both the financial and non-financial performance measures into the managerial decision making process via the TBL framework, this research simplifies and rationalizes the project evaluation and prioritization process. Finally, the proposed project portfolio management tool satisfies the need for a single, integrated and overarching management tool that will combine the three dimensions of sustainability - economic prosperity, environmental quality and social justice - with the organization’s overall strategy and makes an important contribution to the creation of a sustainability culture.

5. Future Work

This paper presents preliminary research findings and provides future research directions for further investigation. The test and demonstration of the model with respect to the evaluation and prioritization of the project alternatives is provided in the Proposed Model and Demonstration subsection. This exercise can be extended to actual company data with ranking verification from appropriate company decision makers. This extension will further minimize the gap between the theory and practice. On the other hand, addressing a real life case may create other problems for further investigation. For instance, the selection of the appropriate specialists who will participate in the prioritization process of the criteria, sub-criteria, attributes and alternatives as well as decisions regarding how these specialists will work together may be other future research areas. Additionally, in a real life case, some of the financial, environmental and social sustainability attributes may not be compatible with the business or industry of which the company resides. In that sense, eliminating some of the existing criteria, sub-criteria and attributes or adding new company and industry specific indicators may be necessary. Also, by using ANP instead of AHP, the proposed model can be generalized so that it can be built as a complex network with the interconnecting components such as alternatives, economic, environmental and social factors.

Finally, although this proposed model evaluates and prioritizes the project areas, deciding which specific projects should be implemented requires other considerations, such as considering the capacity limits on the labor, machinery, materials, etc. The authors continue to work in this area to expand and develop this preliminary decision making tool.

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