

지속가능한 BSC를 사용한 그린 IT 전략 실행과제들의 평가

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Evaluating Green IT Initiatives Using the Sustainability Balanced Scorecard

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Abstract

Performance evaluation has been done using financial indices which are generally regarded as inappropriate for the organizations which are innovative and progressive. Thus, the Balanced Scorecard(BSC) was developed considering long term performance and invisible performance. This BSC has four perspectives of finance, customer, internal operation, and learning. Based on the BSC, a new BSC has been derived with a fifth view of environmental and social perspective, which is now called as a Sustainability BSC.

In this study, we evaluated Green IT initiatives using the Sustainability BSC. The initiatives are categorized as RFID, telepresence, paperless office, logistics management etc. The initiatives were evaluated from the view of five perspectives, resulting in high correlations among finance, internal operation, and environmental and social perspectives. Namely, good initiatives from the view of environmental/social perspective are also evaluated as good from the view of finance and internal operation perspectives. In this study, we recommend organizations to introduce Green IT initiatives by showing how Green IT initiatives have contributed to the organizations.

Keywords: Balanced Scorecard, BSC, Sustainability BSC, Green IT

1. Introduction

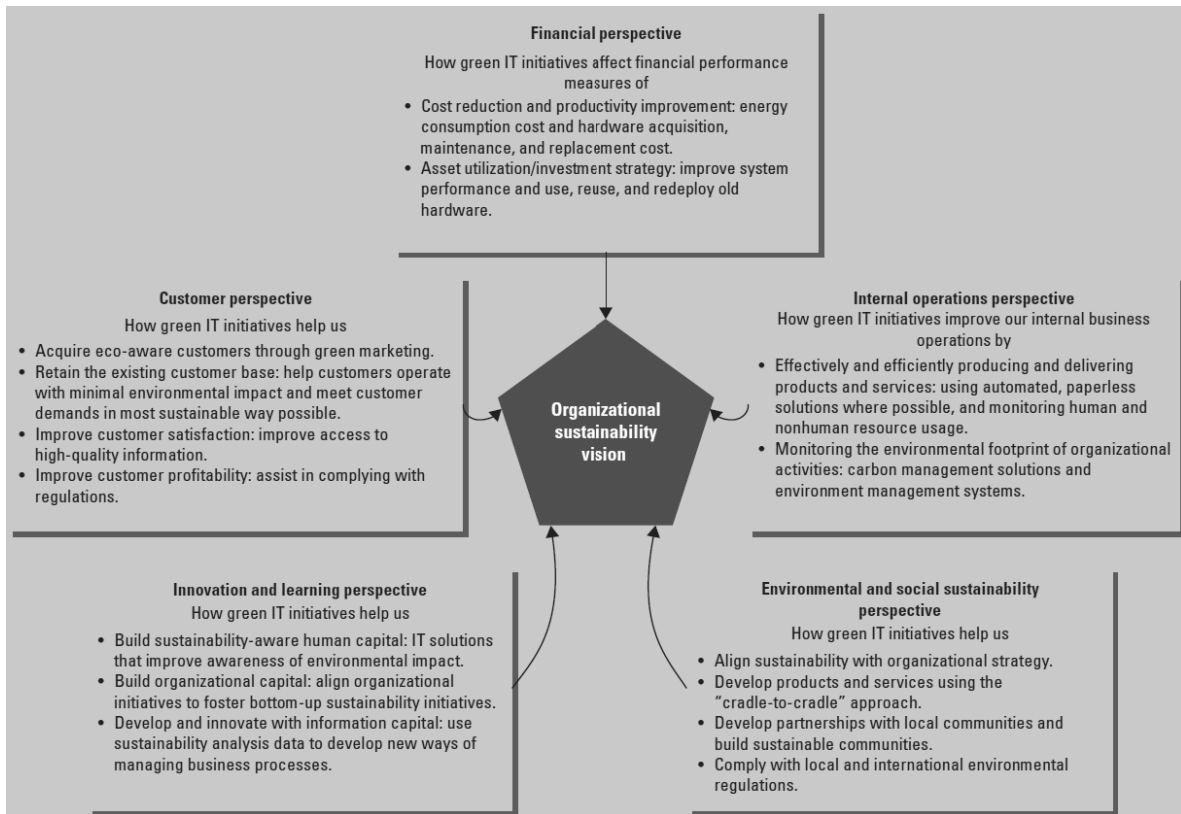
The Balanced Scorecard is one of the most significant management ideas of the past 80 years. The Balanced Scorecard has been implemented in companies to measure as well as to align the strategy to the company. Integrating environmental and social dimension into the existing BSC is pertinent when they are strategically relevant. Some companies saw the

Green IT initiatives as additional cost to the business. However, they have now started to realize in the economical term, for instance, using telepresence or reducing paper utilization can reduce energy bills.

The IT's tremendous potential for enabling organizations to address the triple bottomline of economic, social and environmental value of an investment can bring many improvements to the companies. Finally, on a global level, IT is

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Received July 21, 2017; Revision Received August 11, 2017; Accepted September 11, 2017.



[Figure 1] The Sustainability Balanced Scorecard (BSC).

responsible for 2% of emission of greenhouse gases. However, the remaining 98% is seen as opportunity for IT to help solve the problem.

Thus, it is necessary to analyze the Green IT initiatives and to investigate the driving forces and challenges to determine how they contribute to enterprise-wide performance using the sustainability adaptation of the Balanced Scorecard proposed by R. Jain, R. Benbunan-Fich, and K. Mohan. The [Figure 1] shows the framework incorporates sustainability perspective into the original four BSC dimensions. Thus, it adds a fifth dimension for environmental and social sustainability perspective.

2. Examining Green IT Initiatives

To understand Green IT initiatives and their focus areas, we searched different kinds of search engines and IEEE library for

announcements with the keyword "green it", "green computing", "sustainable IT", "Green IT Initiatives", and "Green IT cases".

A total of 60 articles matched "green it", "green computing", "sustainable IT", "Green IT Initiatives", and "Green IT cases". Non-relevant and duplicates articles were removed, resulting in a total of 37 articles in our dataset.

The search results for relevant announcements of Green IT initiatives were filtered, and then analyzed according to the perspectives identified in the sustainability BSC.

2.1 General Patterns in the Initiatives

In the research, the patterns of new Green IT initiatives are the use of RFID, telepresence, paperless solutions, print efficiency, logistic management software, assets-tracking systems, and e-waste management.

[Figure 2] shows the decomposition of Green IT initiatives mentioned in the final dataset announcements across the five Sustainability Balanced Scorecard perspectives. The motivations behind an organization's strategy can be explicitly or implied, and some initiatives are distributed into multiple dimensions.

The initiatives showed that RFID is a technology that can help



[Figure 2] The Distribution of Green IT Initiatives.

not only generate revenue but also create new commercial opportunities and improve environmental responsibilities.

The range of RFID applications vary depending on project's nature and industry, but the predominance initiatives focused on using RFID for recycling, sensing, and asset tracking.

Telepresence initiatives are driven by economical benefits. Companies that wanted to lower traveling cost found not only an economical reward but also important benefits such as reduction of unproductive time, acceleration of decision making, improvement of the collaboration across multiple global businesses, improvement of the quality of life, and the reduction of carbon footprint.

Many of the paperless initiatives used electronic document management softwares for digitalizing, sharing, and even allowing electronic approvals or requests or signatures. Paperless initiatives thus helped companies save in paper, printing, traveling, and space.

In the case of Print Management Initiatives, the general patterns were based on the replacement of old stand-alone printers for new energy-efficient network printers with default double-side printer and software that requires users to confirm a print job.

The rising of the fuel prices forced companies to find ways to cut transportation costs. As a result, initiatives oriented to improve the transportation-distribution networks were based on application softwares that generate better routers or distribution networks. The decrease in transportation resulted in reducing fuel consumption and CO2 emission.

3. Sustainability Balanced Scorecard Perspectives

The following description quotes nine examples of the announcements. They are identified by the companies mentioned in the newswires, case study reports, and are listed with dates and URLs in <Table 1>.

3.1 Financial Initiatives

Most announcements in the dataset mentioned both financial and environmental benefits. Investments in green RFID projects typically increase revenue while saving cost. For instance, PROMISE is an RFID-based information management system that tracked the entire process of recycling plastics in the automotive industry, while reducing cost and manual mistakes by cutting down human intervention by using RFID technology. Another example that generates revenue can be found in which a trade-off between profit maximization and emission minimization was achieved. The total profit increase due to sensor information is \$6.6 million per year (8 percent) and the achieved emission reduction amounts to 359 tons of CO2 (2 percent).

3.2 Internal Operation Initiatives

Some announcements name specific improvements in the company's internal operations as a result of Green IT projects. Naturally, as a RFID reduces waste and energy consumption while improving quality, people start to realize the joint opportunity for improvement in operational efficiency and environmental sustainability.

The sustainability BSC's internal operation perspective refers to a company's ability to produce and to deliver products and services using automated, paperless initiatives.

The next is the case of Niagara Catholic School District Board (NCSDB), which oversees 53 elementary schools, eight secondary schools, six adult education sites, and a central office.

The school district is required by law to keep student files for 55 years, which amount to a lot of papers. The district found itself running out of space to store all its documents, which continued to pile up each day. Moreover, reliance on paper had other drawbacks. For example, many of the forms used in the administrative offices required multiple approvals. Thus, courier trucks had to drive around the district for daily pickups and deliveries of forms, resulting in high transportation costs and a large carbon footprint. In addition to being environmentally unfriendly, the process often resulted in lost data and delays in approval processes. The solution was using an ECM (Electronic Content Management) system.

<Table 1> Examples of Green IT Announcements

Company & Source	Announcement Title	Date	URL
RecycleBank	Texas Instruments and RecycleBank Make an Environmental Difference - One RFID Tag at a Time	May - 08	http://www.ti.com/rfid/docs/manuals/casestudies/RFID_RecycleBank_Case_Study_2008.pdf
Nestle Italy	Nestle Italy Finds RFID Brings ROI for Ice Cream	April-08	http://www.rfidjournal.com/article/view/4017/
DHL	DHL Says Its SmartTrucks Save Money, Time and CO2	Sep-09	http://www.rfidjournal.com/article/view/5261
Procter & Gamble	Procter & Gamble Transform the Way Business is Done	Nov-09	http://www.cisco.com/web/DE/cisconnect/2010-01/media/External_CaseStudy_Procter_Nov2009.pdf
U.S Postal service	U.S. Postal Service Taps Optimization Software to Slash Transportation Costs	Apr-09	http://www.infoworld.com/d/green-it/us-postal-service-taps-optimization-software-slash-transportation-costs-261
Niagara Catholic School	Niagara Catholic School District Turns to E-docs to Cut Paper and Transport Costs	Apr-09	http://docushare.xerox.com/pdf/niagara_infoworld_article_08_06_09.pdf
The Copernicus Group	The Copernicus Group Independent Review Board.	Mar-11	http://www.cgirb.com/forms/CGIRB_%20InfoWorld_Green_15_Award.pdf
KPMG	KPMG Scores Sky-high Savings with Telepresence	Apr-10	http://www.corporateclimate.net/green-transportation-climate/automobile/533-kpmg-scores-sky-high-savings-with-telepresence.html
Ericsson	Ericsson Drives a Greener Supply Chain	Apr-10	http://www.infoworld.com/d/green-it/the-green-it-stars-2010-454?page=0,6

3.3 Customer Initiatives

In most of the cases, impacts obtained through Green IT were translated into improved customer satisfaction and service directly or indirect.

Pacific Northwest National Lab (PNNL) teams with IBM succeeded in a real-world smart-grid deployment. In the project, homes and businesses of participating customers were equipped with multiple intelligent utility devices from thermostats to water heaters. The devices were tied to the PNNL power-delivery system using Internet-scale Control Systems (ICS), a prototype interoperability framework from IBM. Customers programmed their thermostats and water heaters with tools on the Web, providing preference information about the willingness to have their home or office temperature automatically adjust in case of a power shortage.

The Pacific Northwest Grid Wise demonstration project found that advanced technologies enable customers to be active participants in improving power grid efficiency and reliability and saving money in the process. On average, consumers who participated in the project saved approximately 10 percent on their electricity bills.

3.4 Innovation and Learning Initiatives

R. P. Jain, et al. classified Green IT initiatives that focused on employee job satisfaction and opportunities for innovation and learning into this dimension. Internal process efficiencies have implications not only for customer satisfaction but also for improvement of employees' job satisfaction by freeing their time to perform value-added tasks. An example is Amarak, a professional service company, which says that many of the machines were old, inefficient, and incapable of dual-sided printing and an abundance of the machines were personal printers. The company recognized that it was time for a new print program to address several needs. The company succeeded in achieving its goals by

replacing old stand-alone single-function printers with a reduced number of multifunction devices from Konica Minolta and networked printers from Hewlett-Packard. The result was a reduction of cost from less energy/toner/paper, less waste, and less number of support calls to the IT support desk.

3.5 Environmental and Social Sustainability Initiatives

Some initiatives developed sustainable partnership with local communities. This is a case of RecycleBank.

RecycleBank is an innovator in industrial and technological standards. For instance, by using innovative and breakthrough technology, RecycleBank has created an environmentally conscious solution for communities to deal with the rising cost of waste collection. RecycleBank enables households to streamline recycling efforts with the tools while providing municipalities to measure the amount of material each home recycles with the technology. The weight of the recyclable resources is then converted into RecycleBank reward points that can be used at hundreds of local and national participating reward partners. RecycleBank is easy to implement a market-driven work, which saving municipalities' money, giving citizens rewards for their environmental stewardship, and bolstering local economies

4. Conclusions

This study reveals that Green IT initiatives are growing in the IT industry, and how those initiatives are linked with the Sustainability Balanced Scorecard's dimensions. Many companies have implemented specific environmental or social management systems linked with an economic success of the firms. Among many initiatives, green RFID, telepresence, paperless solutions, print efficiency, logistic management software, assets-tracking

systems, e-waste management are once again at the center of these exemplary Green IT initiatives.

In spite of the increasing availability of full-featured green IT products and services, Green IT is still not in full plug-and-play. Reaping profits from Green IT investments is still hard work, with many organizations struggling to get participation from management and end-users. The Green IT initiatives were successful in large part because the top management makes efforts to achieve their goals and strategies.

Another interesting facts about the initiatives are the collaboration among multiple parties and the wealth of third-party products and services emerged to help companies jump-start Green IT projects such as measuring and managing data center efficiency, launching large-scale recycling efforts, taking advantage of free cooling, and going paperless. Vendors are working to meet the needs of IT organizations seeking to capitalize on sustainable practices. That's good news for organizations that don't have the internal technical know-hows to build such systems themselves.

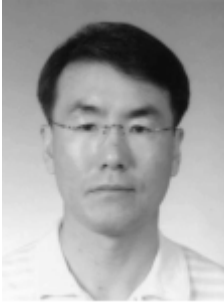
The relationship among environmental, financial, and internal operations benefits from the initiatives is evident in our analysis. Therefore, companies can evaluate Green IT initiatives with a triple focus on environmental, economic and internal operation indicators. However, it is very important that the customer and innovation perspectives are well and large implementing in Green IT Initiatives, thought other good relationships aren't represented, should not be ignored.

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저 자 소개

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