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Waste Management Practices Adopted by Brazilian Companies Members of the Corporate Sustainability Index of the Stock Exchange

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This article demonstrates the practices and waste management policies (WMP), adopted by companies participating in the Corporate Sustainability Index (CSI) of the state of the stock exchange in Sao Paulo, Brazil (BOVESPA). It also presents the results that these practices provided for these companies and for the environment. The study was conducted in the two companies with the highest sales in the year 2013 in the fields of power generation, financial institutions, water and wastewater, pulp and paper, telephony and highway concession. The search strategy was divided into five stages and through the 2013 year of sustainability reporting content analysis, it was found that companies that already have advanced and positive practices with respect to sustainability, serve as reference and stimulus for other companies adopt these concepts. The survey also found that companies in the electricity sector that have the same types of waste, have different management practices, a fact confirmed in telephone companies too, highway concessions and financial institutions. It also showed that the adoption of WMP practices provided advantages in terms of cost reduction and revenue growth for all companies surveyed and mostly, all these gains also reflected positive results for the environment and nature.

1. Introduction

The importance of waste management has been discussed worldwide. Countries of the European Union have applied waste management (WM) techniques focused mainly on the reduction of landfill destination (Eurostat, 2012). In the United States, the main concern is to create a competitive market for reuse and recycling, meeting environmental aspects (Kahhat et al., 2008). In China, studies have identified indicators that monitor WM construction at the time of the effective execution of projects (Yuan, 2013). In Brazil, WM has been developed through public-private partnerships, where the government has a regulatory role (Kruljac, 2012). Waste generation by business activity is continuous, including manufacture, services and retail, causing all segments companies to invest constantly in environmental management and treatment of their waste (Rudăreanu, 2013). These practices, in addition to meet environmental and legal issues, are also measured and demonstrated, mainly to capital market participants and for companies that have their shares traded on stock exchanges (Marcondes and Bacarji, 2010). The Dow Jones Sustainability Indexes (DJSI) in New York; Financial Times Stock Exchange 4 Good (FTSE4Good) in London; the Johannesburg Stock Exchange (JSE); and the Corporate Sustainability Index (CSI), in São Paulo, allow investors to identify the results of sustainable practices adopted by companies they wish to invest (Pätäri et al., 2012).

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In the last decades, several models and methodologies that incorporate environmental, economic and social aspects has been developed to aid the decision-making process and strategies on WM in various business segments (Ghinea et al., 2014). In this sense, the literature shows many related studies. Kahhat et al. (2008) discuss the concept of e-waste, through a study on the management of electronic waste in the United States. Diana and Kozarska (2009) conducted a study that identifies the true cost associated with the generation of waste wood from furniture companies in Australia. Francheti (2012) built a model to better understand the generation of solid waste US companies and government agencies. In the Czech Republic Kropáč et al. (2012) evaluated whether combustion plants of hazardous industrial waste, can serve as facilities for energy production. Šomplák et al. (2013) developed a logistics tool for conceptual planning of power generation through municipal solid waste heat treated. Tripathi and Gaurav (2014) show model which addresses waste minimization practices for paint industries. Al-Hamadani et al. (2014) analyzed the strategies adopted by Chinese companies for minimizing construction waste. By evaluating the life cycle, Schott and Andersson (2015) found that the results of the waste composition analysis showed that an average of 35 % of household food waste is avoidable. Although many studies present results of WM practices, gaps are observed regarding the identification of effects for the company and for the environment.

Given the context, the objective of this research is to identify the practices and WM, adopted by participants CSI BOVESPA companies, as well as identify the results that these practices provided for businesses and for the environment in representative segments of the Brazilian economy: energy, financial institutions, water and wastewater, pulp and paper, telephony and highway concession. The study is divided into five parts: introduction, theoretical framework, methodology, results, and conclusions.

2. Theoretical Framework

Sustainable processes provide organizations to increment their social actions and to adopt policies concerning environmental issues, generating cost savings and increased revenues (Nidumolu et al., 2009). Private companies have increasingly developed sustainable projects. In addition to meet legal requirements, they could also optimize throughput, with cost reductions and new sources of revenue (Lund, 2013). Another important aspect was the increase of the legal rigor, since many countries implemented laws that require actions in this area. On the other hand, public pressure also forced organizations, in particular those of industrial activity, to green their practices (Sellitto et al., 2011). So, investors take close attention to indicators, such as the DJSI, that interconnects financial performance with sustainability of leading companies. DJSI checks the sustainability of companies from three dimensions: economic sustainability, addressing criteria such as corporate governance and risk management and crisis; environmental report; and social developments, covering corporate citizenship, work ethic, human capital development, attraction and retention of talent, among others (Pätäri et al., 2012).

2.1 Corporate Sustainability Index (CSI) BOVESPA

The CSI BOVESPA was created with the aim of showing the market performance of a portfolio of companies that adopt the principles of sustainable management. Initially, it met 34 shares of 28 companies, evaluated as the most advanced in the implementation of corporate sustainability practices in the country. Besides serving as a benchmark for investors concerned with sustainability, the CSI encourages other companies to incorporate environmental, social and governance in decision making on investments, making the market more attractive for investors in general and in particular for managers committed to socially responsible investment (Marcondes and Bacarji, 2010). In the year 2013, 37 companies in various business segments compose the portfolio of CSI and all those companies have formally committed to insert in sustainable development issues in their strategy and freely publish it in the web: 92 % joined formally and publicly the widely legitimized voluntary commitments related to sustainable development, affecting all units, subsidiaries or subsidiaries; 100 % sustainability report published last year; In 78 % of cases the report is part of the main corporate reporting; In 86 % of cases there is direct involvement of the company's management in defining the Sustainability Report (BM&FBOVESPA, 2013).

3. Methodology

Five main steps were defined, as shown in Figure 1. Initially we analyzed the 2013 CSI portfolio to identify segments: electric power generation, metallurgy, financial institutions, water and wastewater, pulp and paper, telephony and highway concession. Then, the financial statements were analyzed, especially income statements, where the two companies with the highest sales in US dollars of each sector, except it was identified in the metallurgy sector that consists of only one company in this form, were selected for the search: CPFL Energy, Paranaense Energy Company- COPEL, Gerdau, Brazil Bank, Itaú Unibanco, Minas

Gerais Sanitation Company - COPASA, Sanitation Company of São Paulo - SABESP, Suzano Pulp and Paper, Fibria Pulp, OI Telephony, CCR Highways, Ecorodovias Highways and Telefonica Brazil, which amounted to 13 companies, representing 35.13 % of all companies of the CSI in 2013. Then, by content analysis, we extract the typology of waste produced by each company, WM practices adopted, results that each company obtained with WM, and finally, what the impacts on the environment.

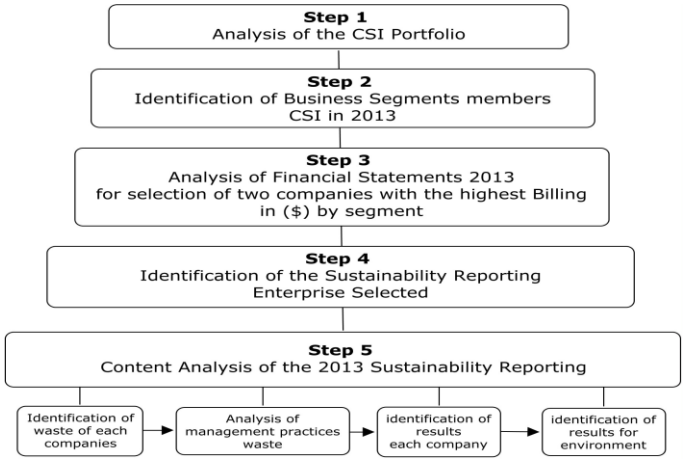

Figure 1: Research Structure

4. Study Results

The study included 13 companies from seven business segments, based on the CSI portfolio companies in 2013. For delimitation of the sample, only the two companies with the highest turnover were selected for each segment, except the metallurgy sector that presents one company. Thus, the main waste that each company produces and billing each were identified, as shown in Table 1:

Table 1: Segments, Waste and Enterprises Billings

Companies	Segment	Main waste	Billing ($)
CPFL	Electric power	Poles, concrete, cables, meters, burnt and old equipment lamps.	7,469,661
COPEL	Electric power	Cables, copper and aluminum wires, scrap metal and lubricating oil.	2,875,511
GERDAU	Metallurgy	Ferrous scrap.	17,016,579
BRAZIL BANK	Financial Institution	Toner cartridges for printers, lamps, batteries, electronic equipment, paper, plastic, metal, glass.	44,211,074
ITAÚ UNIBANCO	Financial Institution	Electronic waste, equipment and replacement parts.	40,466,576
SABESP	Water and Sewage	Solid waste, sludge and gases generated in treatment of sewage.	4,830,345
SUZANO	Pulp and Paper	Wood waste.	2,428,338
FIBRIA	Pulp and Paper	Wood scraps, industrial waste: lime slurry and boiler ash.	2,952,875
OI	Telephony	Remains of metals, batteries, cell phones, plastic and paper.	12,132,736
TELEFÔNICA	Telephony	Cell phones, batteries, cables, antennas and offices computers.	14,821,949
ECO HIGHWAYS	Highway Concession	Asphalt material, recyclable materials such as paper, plastic, organic waste.	882,589
CCR	Highway Concession	Tires and asphalt material.	2,568,325

In the electric power companies is observed that despite serving in the same industry, have different types of waste, indicating that their WM policies deal differently with each one, because when a recycles and reuses, the other eliminates. This behaviour is also observed in financial institutions, telecommunications and highway concession. Already, companies in the sectors of water and wastewater, pulp and paper have the same types of waste, a fact that points to similarities in their WM practices. Based on indications seen in Table 1, there was a content analysis of sustainability reports, which allowed identify the WM practices that each company adopts also observed that the main results they are getting with the adoption of it's regarding waste policies and, what effects these actions have provided the environment. After the execution of the research, the following results were identified by company:

CPFL - Main Practices Waste Management: Recovery meters and transformers. Burned out bulbs, are intended for a company that separates the glass mercury and aluminum, which can be recycled. Results for the Company: Reduces the use of new materials and provides reduction of immobilization costs of new equipment. Results for the environment: The recovery equipment, reduces waste generation. Already, in the recycling of lamps the proper disposal of mercury prevents contamination of soil and water.

COPEL - Main Practices Waste Management: Keeps Program Corporate Waste Management, which aims to implement and systematize the best form of management practices to not harm the environment. Results for the Company: The sale of waste as cables and copper and aluminum wires, scrap metal and lubricating oil put additional revenues for the company. Results for the environment: With the sale of waste and their reuse, allowed to disposing of them in nature, avoiding soil and water contamination.

GERDAU - Main Practices Waste Management: In 2013, about 75 % of the steel produced by Gerdau was made from recycled materials no longer used by the company. Results for the Company: In 2013, 82.5 % of the by-products generated by Gerdau were reused internally and by different segments of the economy and contributed to a savings of 30 % to 50 % cost savings compared to traditional materials. Results for the environment: The use of scrap contributes to reduce energy consumption and minimize the emission of carbon dioxide in the atmosphere.

BRAZIL OF BANK - Main Practices Waste Management: Has the Selective Collection Program that manages the disposal of recyclable solid waste and forwards to cooperatives or associations of collectors and public selective collection. Results for the Company: Cost reduction, revenue growth, risk mitigation. Results for the environment: Minimizing the environmental impact of operations and encouraging recycling.

ITAÚ UNIBANCO - Main Practices Waste Management: Has control program on waste generated by administrative buildings. Results for the Company: Through the control run on waste, there is the awareness of employees on the use of materials used in work activities, generating reduction in the consumption of such products. Results for the environment: Thus, it was reduced by approximately 9 % waste generation who were sent to landfills, reducing soil contamination.

COPASA - Main Practices Waste Management: Generates electricity from biogas by a Sewage Treatment Plant. Use programs and partnerships to expand the practical reduction and recycling of solid waste. Results for the Company: Reducing operating costs by using own electricity, generating energy efficiency. Results for the environment: The kidnapping of pollutant emissions help reduce global warming, preserving the environment.

SABESP - Main Practices Waste Management: Promote the use of gases generated in sewage treatment, solid waste management, sludge processing into agricultural compound. Results for the Company: The beneficial use of waste as an agricultural compound and material for reclamation, bring extra revenue to the company through the sale of this compound to farmers. Results for the environment: The use of gas is to reduce the provocative greenhouse and the volume of waste that follow to landfills. The sludge treatment provides the return of water to clean rivers.

SUZANO - Main Practices Waste Management: Promote reforestation, wood scraps are used for production of renewable electricity, the waste water is treated in treatment plants. Results for the Company: More than 30 % of the waste generated during their productions are reused (incorporated in cogeneration), reducing the volume of waste sent to landfill. Results for the environment: Reducing emissions of greenhouse gases.

FIBRIA - Main Practices Waste Management: Takes advantage of wood waste for the production of biofuels. Produces corrective soil from the industrial waste from the pulp production process. The pulp production is powered by an energy matrix, which basically uses renewable natural resources. Results for the Company: The production of soil amendments generates economic and environmental benefits, saving costs in limestone purchase for eucalyptus plantations. More than 90 % of the energy matrix is composed of renewable fuel. Results for the environment: A soil amendments output provides the use of industrial wastes that would be discarded in the environment, which is left to decompose in nature, would generate

greenhouse gases. In addition to the use of renewable energy, not be using the energy of the local dealership.

OI - Main Practices Waste Management: In 2013, 634,000 t of waste were generated, assigned to certified companies to promote proper disposal, disposal or reuse of materials. Where destined for recycling 5,400 t of scrap. Promote selective collection in the administrative buildings. Results for the Company: Some materials are often referred for purchase by supplier; furniture and electronic equipment are sold by Auction Intermédo generating additional revenue in the company. Results for the environment: The correct disposal of waste prevents contamination of the soil, streams and other natural environments.

TELEFÔNICA - Main Practices Waste Management: Collects mobile phones, batteries and accessories for recycling and reinserted as new products. Results for the Company: Cables, antennas, offices computers and other such materials are collected and then sold as scrap generating revenue for the company. Results for the environment: The reuse of materials such as scrap, reducing the consumption of natural resources.

ECO HIGHWAYS - Main Practices Waste Management: Uses recycled asphalt material and promotes selective collection. There waste separation process, which increases the recycling rate, and all passes through composting organic waste. Results for the Company: Recycling the asphalt material, there is a decrease in the use of new raw materials, generating economy for the company. Results for the environment: The reduction of waste disposed, helps preserve the environment and to reduce the emission of greenhouse gases.

CCR - Main Practices Waste Management: Ecological asphalt application with use of waste tires, and recycling of their own that will floor object. Results for the Company: The use of unsuitable tires in paving process generates savings in raw materials and reduction in cost of goods and services. Results for the environment: The reuse of tires and asphalt, provides a reduction in the pollution of the environment and the reduction of discarded waste.

The results indicate that companies that developed WM in the electricity area immobilized less equipment resources and yet obtained revenues from sales of yarn leftovers and cables. The metallurgy company reused 82.5 % of their waste production and obtained economy between 30 % and 50 % in its raw materials. The water and sewage companies produced energy and agricultural compounds waste, reducing the purchasing power and generating revenues from the sale of the compounds by local farmers. Financial institutions reduced their consumption of paper, packaging and work materials and obtained revenues from sales of electronics scrap. Paper and pulp companies reused 30 % of the waste in their own cogeneration and produced soil correctives that are used in eucalyptus plantations. Telecommunications companies started to get new revenues from the sale of electronic waste and the repurchase of these by its suppliers. Highway concessionaires used tires and recyclable waste for development of ecological asphalt, reducing maintenance costs of roads. It is demonstrated in the study that all companies besides getting advantages in costs and revenues, significantly preserved the environment.

5. Conclusions

The study showed that adoption of waste management practices can contribute to the environment as well as for a competitively management of organizations, by costs savings. Yet, with programs such as DJSI and CSI, companies that excel in the adoption of WM practices, become more attractive to investors and to the market. The studied companies have advanced practices with respect to sustainability and its positive results serve as a reference and encouragement for other companies to adopt these concepts. The research also found that companies in the same segment as the case of electricity, financial institutions, telecommunications and highway concession, although generate similar wastes have adopted distinct WM practices. The study also revealed that the adoption of WM practices provided benefits for all companies and all gave positive results with respect to the environment and nature.

As further research, we suggest a quantitative survey involving the influence of WM in performance measurement, such as cost, quality, flexibility, and innovation. Structural equations can evaluate this influence. Cluster analysis can define clusters of companies that adopt similar WM techniques. Factor analysis can reduce the number of factors without sensible loss of information.

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