
Abstract Number: 025-1014

Brazilian scenario for the recycling industry

Henrique Pedrosa Chagas, hpchagas@yahoo.com.br

University of São Paulo-Polytechnic School - Production Engineering Department

João Amato Neto, amato@usp.br

University of São Paulo-Polytechnic School - Production Engineering Department

POMS 23rd Annual Conference

Chicago, Illinois, U.S.A.

April 20 to April 23, 2011

Abstract

This paper aims to present the current scenario of the waste recyclable materials industry in Brazil, highlighting the recent legal context, social features, market agents, and market statistics. Recycling must be considered for a responsible operation that does not compromise the human relations and environment. Although this concern is not new, it increased as a result of social pressure, legislation and competitive differential. In Brazil, this complex scenario involves social inclusion, recent laws, relevant economic earnings, cooperatives organizations and great growth potential market.

Keywords: Productivity Process; Recycling; Social Inclusion; Cooperatives.

Introduction

Until recently in Brazil, the ways in which the disposal of post-consumer waste occurred were not an issue directly related to the operation of second-sector companies, besides those established by the sustainability pressure. This responsibility was, at most, a government's burden.

This scenario is now changing for many reasons: natural resources rareness, environmental degradation, social pressure toward sustainability and harder rules for operation processes. On this last matter, the promulgation of the Brazilian federal law nº12.305/2010 called as "National Policy for Solid Residues" (PNRS) is a new regulation milestone that establishes co-responsibility for industries, retailers, civil society and many other players in the solid waste treatment and destination issue. Topics as garbage generation and disposal, recycling, reverse logistics, lifecycle assessment, green supply chain, social inclusion and collectors cooperatives gained a new impulse and priority on everyone's agenda.

It is a consensus that our way of life produces too much garbage. Accordingly to IBGE¹, in 2008, 259,547 tons of solid waste was collected per day in Brazil. In a year it is 94,734,655 tons and only 2% were taken to specialized sites that can separate the recyclable materials or reuse the organic compost. Moreover, accordingly with the same institute, only 994 cities from the 5564 declared having some kind of recycling waste collection service implanted in 2008.

By the study of CALDERONI (2003) it is known that 32% of this wasted material is recyclable. So, from the numbers above, at least 83,055 ton/day could potentially be reinserted in the productivity chain.

¹ Brazilian Institute of Geography and Statistics - IBGE.

As a response to this challenge a whole new market is on development. Logistics, R&D and operation management are in the center of the imperative solutions needed.

On this context, the aim of this article is to present the current scenario for the waste recycling industry in Brazil. The following questions are in focus: Who are the market players? Which is the market size? Which are the directions given by the government to share responsibilities and promote social inclusion at the waste management issue?

Methodology

The main goal of this study is identify the organizational and economic aspects of the post consumed waste recovery activity (recycling industry). Although recycling takes place as an import issue in many sustainability aspects and solutions there is a lack of information about the recycling industry organization and its economic earnings in Brazil. Thus, this ongoing research is based on literature review and, at this step, uses mostly secondary data published by the transformation industry representatives and official information published by government. The following conceptual terms were investigated: waste management, solid residue management, recycling index, reuse index, recycling cooperatives, recycling process, recycling market.

The industries and government representatives studied were:

Organization Name		Industry Sector
ABAL	Brazilian Aluminum Association	Aluminum
ABEAÇO	Brazilian Steel Association	Steel
ABIPET	Brazilian PET Industries Association	PET Plastic
ABIVIDRO	Brazilian Automatic Glass Industries Technic Association	Glass
ABRE	Brazilian Package Industries Association	Package (General)
ANAP	National Scrap Paper Association (Brazil)	Scrap Paper
BNDES	Brazilian Development Bank	Bank
BRACELPA	Brazilian Pulp & Paper Association	Pulp & Paper
CEMPRE	Entrepreneurial Commitment for Recycling Organization	Second Sector (General)
FEVE	European Container Glass Federation	Glass
IBGE	Brazilian Institute of Geography and Statistics	Official Statistics
PLASTIVIDA	Social-Environmental Institute of Plastic Industries (Brazil)	Plastic

Recycling Market Overview

Recycling index and volumes

In the way to find the current total amount of recycled material processed, the publications from paper, plastic, glass and metal industries' representatives were revised. It was found that the recycling index is taken by the percentage of post-consumed material used at the production line to produce new goods. So, they calculate the recycling index by dividing the post-consumed material used by the total material produced in a period. This index is also called "reusing index".

However, is important to contrast the differences between the industries and government points of view. For the first, recycling is taken by the approach above, but for the second one, who has the garbage collection, treatment and disposal duty, the recycling index is show as the % of garbage submitted to triage and reuse. Accordantly to IBGE (2008), only 2% of all solid residues collected in Brazil are submitted to recovery facility or composting plant.

Below is presented the recycling index and the amount of material recycled published by the industries. The amount of not recycled material is calculated and presented too:

Table 1 – Industries recycling indexes (reuse index) and recycled material volume.

Material	Source	Year	% Recycled [4]	Recycled Volume (1000 T)	Not Recycled volume (1000 T)	World`s Benchmark	% Recycled
Apparent Paper [1]	BRACELPA	2010	43,50%	4.028,60	5.232,55	South Korea	91,60%
White paper	BRACELPA	2010	27,71%	821,00	2.142,00		
Paperboard+Kraft	BRACELPA	2010	69,70%	3.031,00	1.317,64		
Tetrapak	BRACELPA	2010		27,40			
Others	BRACELPA	2010		149,20			
Aluminum	ABAL	2010	38,30%	500,31	805,99	UK	57,30%
Aluminum cans	ABAL	2010	97,60%[2]	381,21	9,37	Brazil [2]	97,60%
Glass	BNDES / ABIV	2005	45,00%	452,25	552,75	Belgium	96,00%
Steel	ABEACO	2010	47,00%	280,00	315,74	Belgium	88,00%
Plastic	PLASTIVIDA	2010	19,40%	953,00	3.959,37	Germany	34,00%
PET	ABIPET	2009	55,80%	282,00	223,38		
				6.496,16	11.089,78		

[1]Consumption of apparent paper.

[2]% of aluminum cans recovery.

[3]According to ABIVIDRO only 15% of glass packaging is "one way" type.

[4] Consumption in Brazil (Production - Exports + Imports).

Market Agents

At the metropolitan landscape some agents are seen doing a great number of activities related to the recyclable material process. The activities vary and in some cases are overlapped. The mainly actors seen are:

Garbage collectors or *Binman*:

Very poor people that spend de day walking around looking for the recyclable material present in the garbage bins. Some of them collect material from establishments that donate it.

They are present at the first step of the recycling chain, gathering, and sell the material to recycling cooperatives and small-sized scrap dealers without any beneficiation.

Accordantly with BONDUK² (2010), is estimated that there are 800 thousand people at this situation in Brazil. The number is expressive and represents 0.5% of the population of the country.

Recycling cooperatives:

Industrial cooperatives co-owned by workers. On the recycling context, they are predominantly organized, supported and financed by the municipal power and third-sector organizations which have great interest in garbage treatment as a way to promote social inclusion and reduce costs in waste disposal. Those cooperatives are formed predominantly by long term unemployed people in poverty situation. Accordantly to BONDUKI (2010) there are 30,000 workers organized in cooperatives nowadays.

Unfortunately many of the investments made by government were lost as explained by the same author. The main reasons of the failure of the investments were: under

² Nabil Georges Bonduki is the secretariat of Water Resources and Urban Environment Department in Brazilian Environment Ministry (SRHU/MMA).

estimated operation scale; financial and economic insufficiency; no knowledge about the productivity method and management.

The cooperatives are established at the beginning of the productivity chain and do not execute all the material beneficiation process. The main activities done are: door-to-door selective collection, sorting and compact the material. At this step of the work the material still do not have too much value and some of the cooperatives do not have even the machines to get to this point.

Cooperatives sell the material to middle-large scrap dealers and, in some cases, to recycling industries.

Small and middle-large scrap dealers:

Small and middle sized businesses that act predominantly at the middle of the chain. Most of them buy cheap sorted material from cooperatives and garbage collectors and sell it to bigger dealers or for the recycling industries. Some of them collect the material from selected commercial and residential buildings too. Most of them do not process or beneficiate the material, acting as intermediates.

Big scrap dealers:

Large companies that act similarly as the previous but most of them are focused in one kind of material. They are segmented by markets as paper, plastic, glass and metal. Their role in the process chain is to beneficiate at maximum the previous sorted material, adding value to sell as raw material to the recycling industries.

Recycling Industries:

Industries that buy the recyclable material to produce new goods. Their sizes vary a lot depending on the segment (plastic, paper etc). In the plastic segment a large number of industries can be found. It does not happen at the metal or glass segment, because of the

complexities to establish this kind of industry. At the paper segment very big scrap industries are established but some small and middle large are present too.

The legal scenario

At the second semester of 2010 a new federal law, n°12.305/2010 called as “National Policy for Solid Residue” (PNRS) was promulgated. Although the solid residues was not a new concern and there are other laws that regulate the same issue, the comprehensiveness of the new law made it take the center of the operational management discussion for all companies and all government power spheres.

Based on BONDUK (2010), its main subject is the solid residues disposal and how it must be done from now on. It rely upon the co-responsibility to reduce, reuse and correctly disposal the residues and establish rules for many industries sectors as commercial establishments, agribusiness, construction, health care and civil society too.

In this context, and still accordantly with the same author, the reverse logistics and recycling are the most discussed issues. Thus because the first was settled as the solution for many post-consumer materials like tires, batteries, electronics, agro-toxics, fluorescent lamps and lubricant oil. So, for now on, those industries are responsible for theirs post-consumed material and has until 2014 to present a sectorial agreement, that formalize how they will act from now, to the Environment Ministry.

The recycling matter is largely discussed because it has the social, economic and environmental facets. Accordantly to the law (PNRS) and the previous author, the municipal power and industries must consider de recycling cooperatives as part of the solution given to the residues. So the cooperatives must appear at the sectorial agreements. With this settlement government aims to promote social inclusion and wealth distribution.

The law sets some targets to government power too. It establishes that all non-sanitary landfill sites must be closed until August of 2014. Moreover, all cities must have their solid residues management plan and it must include directions to foment and establish non-generation, reduction, reuse, recycling, treatment and final-disposal activities. Moreover, this plan must include de recycling cooperatives too.

The law applies rules (not new) for the citizens too. Once the sectorial agreement and municipal plan were approved and wide published, citizens must follow those agreements and sort, package, return or correctly dispose the residues.

Market Statistics

In an effort to calculate the recyclable material market size, the recycled material volume presented at Table 1 were grouped to the material's trading values published by CEMPRE³. Below are shown the negotiated prices of each material in many cities of Brazil and an average for each material were calculated.

The prices are for materials sorted by type and compacted but not totally ready to become into a transformation industry process. It means that the total prices that the material can get are higher than show below:

Table 2 – Recycling material prices in many cities of Brazil.

	Paperboard	White Paper	Steel Cans	Aluminum	Glass (Clear)	Rigid Plastic	PET Plastic	Film Plastic	Tetrapack
City	Values in US\$ / Ton								
Manaus	137	286	74	1257	57	171	514	171	-
Guarapari	154	97	80	1600	-	286	457	286	57
Itabira	171	448	211	1771	143	650	1000	686	234
Lavras	143	189	114	1371	97	571	971	543	57
Jaboatão	211	160	183	1314	103	686	886	571	200
Recife	183	160	171	1143	103	686	943	571	183
Nova Esperança	154	171	143	1543	57	571	714	457	103
Mesquita	114	257	171	1600	126	457	800	429	126
Rio de Janeiro	143	331	97	1314	86	286	800	343	120
Canoas	131	229	69	1257	40	171	777	400	69
Porto Alegre	160	314	91	1429	26	171	629	229	57
Guarujá	103	114	114	1371	20	314	829	314	120
Guarulhos	131	291	200	1714	69	600	857	971	143
São José	114	114	-	1486	86	851	943	257	114
São Paulo	154	303	183	1771	69	571	857	457	143
Average	147	231	136	1463	77	470	798	446	123

Considering these prices, the recycling index and the total amount of recycled materials showed at the table number 1, the following amounts can be calculated:

³ Entrepreneurial Commitment for Recycling Organization (CEMPRE) is a nonprofit association dedicated to promoting recycling within the concept of integrated waste management. Founded in 1992, CEMPRE is maintained by private companies from various sectors.

Table 3 – Recycling Market Value.

US\$ 1,00 = R\$ 1,75	1	2	3	4	5	6
	Average Price (US\$/Ton)	Current Recycled Volume (1000 T)	Current market value (1000 US\$):	Remaining % to achieve 80% recycling rate	Additional Volume (1000 T)	Additional Market value (1000 US\$):
Paperboard	147	3031,00	\$ 445.701,33	10,30%	447,91	\$ 65.864,04
White Paper	231	821,00	\$ 189.658,82	52,29%	1549,40	\$ 357.926,16
Steel Cans	136	280,00	\$ 38.057,14	33,00%	196,60	\$ 26.720,97
Aluminum	1463	500,31	\$ 731.886,30	41,70%	544,73	\$ 796.857,93
Glass (Clear)	77	452,25 [1]	\$ 76.140,00	35,00%		
Rigid Plastic	470	[2]		0,00%		
PET (plastic)	798	282,00	\$ 225.170,29	24,20%	122,30	\$ 97.654,50
Film Plastic	446	953,00	\$ 424.765,71	60,60%	2976,90	\$ 1.326.845,48
Tetrapak	123	27,40	\$ 3.376,35	[3]	27,40	\$ 3.376,35
		Current Total (A):	\$ 2.134.755,95			
					Additional potential Market (B):	\$ 2.675.245,43
					Total (A+B)	\$ 4.810.001,37

[1] Since it was not possible to segregate the glass types, the total was multiplied by the lower residual value.

[2] Since it was not possible to segregate the plastic types, the total was multiplied by the lower residual value.

[3] Considering double the current volume

At the first column the average price of each material is presented. At the second the total current amount of recycled material processed is shown thereby the actual US\$ 2.13 billion market is found (column 3).

There rest of the table is an inference, considering that it could be possible reach an 80% recycling index for all the material above. So, the forth column shows the additional % needed to reach 80% from the actual index. From it, the fifth column calculates the additional material volume and the sixtieth the additional money that could be generated, reaching a US\$ 4.81 billion market, 125% larger them the actual size.

Final Considerations

Although this subject must not be seen only by the economic side it is possible to see how much is wasted by all the social spheres. It foments the discussion about how much wealthy this activity (recycling) can bring to social inclusion. In this aspect is worth to say that the new PNRS engage good directions.

Moreover, the methodology used to establish the potential economics earnings were simplistic and nearsighted, considering only a few of the microeconomic aspects and none of the macroeconomics ones. As proposed by SABETAI (2003) the macroeconomic aspects must be considered in a way to find the real earnings promoted by reuse disposed materials. This involves the potential of new technologies patents, new necessary business, new products, and many production coasts saving like energy usage and generation, raw material saving, hydric resources saving, environmental controlling and recovery, disposal consumption and others.

Finally, one important thing to observe is that although the PNRS establish the co-responsibility between the social actors around the solid residues issue, too little is explored about the organic residue. This residue is more than 50% of all the garbage and from the previous numbers is possible to detect the huge amount it represents. But certainly it does not have de same economic value (nowadays) as the others and it seems that will continue to be a public burden.

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