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Paying Waste Pickers for Environmental Services: A Critical Examination of Options Proposed in Brazil

Jeroen IJgosse

WIEGO Technical Briefs

The global research-policy-action network Women in Informal Employment: Globalizing and Organizing (WIEGO) Technical Briefs provide guides for both specialized and non-specialized audiences. These are designed to strengthen understanding and analysis of the situation of those working in the informal economy as well as of the policy environment and policy options.

This report was commissioned under the Inclusive Cities Project by WIEGO's Waste Picker Specialist, Sonia M. Dias, who is a visiting professor at the Federal University of Minas Gerais in Belo Horizonte, Brazil.

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Abbreviations

CEIVAP	the *Comitê de Integração da Bacia Hidrográfica do Rio Paraíba do Sul*, or Commission for Integration of the Watershed of South Paraíba River
CEMPRE	*Compromissa Empresarial para Reciclagem*, the Brazilian Recycling Commitment
IPEA	*Instituto de Pesquisa Econômica Aplicada*, or Brazilian Institute for Applied Economics
MBOs	membership-based organizations
MMA	Ministry of Environment
MNCR	*Movimento Nacional dos Catadores de Materiais Recicláveis*, or National Movement of Waste Pickers of Recyclable Materials
NGOs	non-governmental organizations
PSAU	*Pagamentos de Serviços Ambientais Urbanos*, or Payment for Urban Environmenal Services
R$	Brazilian Real
SNIS	*Sistema Nacional de Informações sobre Saneamento*, or National Sanitation Information System
t	metric ton equal to 1,000 kilograms (kg)

Foreword from WIEGO's Waste Specialist

Brazil has been in the forefront of progressive legislation and public policies geared to the integration of its informal recyclers. In the last 12-15 years Brazil has seen the enactment of laws supporting the social inclusion of these workers and the implementation of public policies designed to support their membership-based organizations (MBOs), the cooperatives and associations of the *catadores* (see below for a note on this terminology).[1] In its effort to contribute to the design of solid waste policies that concomitantly address social and environmental dimensions, the Brazilian Institute for Applied Economics (IPEA) drafted a policy document for payment of the *catadores* for their environmental services. This was in response to a demand put forward by the Brazilian movement of *catadores* (the MNCR) to have the *catadores* compensated for the urban services they provide in waste management. These services include collection of recyclables and scrap, which benefits the environment (through extension of the life span of sanitary landfills through the diversion of recyclables, contributions to cities' cleanliness, reduction of pollution, etc). To claim that *catadores* provide an environmental service has been one of the main strategies adopted by the MNCR in Brazil.

The rationale for the policy document produced by IPEA was that the average income that waste pickers receive is not adequate in relation to the service they provide to the environment. Three main instruments were proposed by IPEA to guide payment for environmental services: productivity payment; graduated compensatory additions; and a cooperative fund.

This proposal of service remuneration encounters various limitations in terms of how to work out its value and what is the adequate institutional design for its operation, to cite a few. Although this policy document has not yet been implemented in Brazil, the relevance of this proposal calls for a wider discussion about the methodology devised by IPEA that can help frame claims for waste pickers worldwide.

This Technical Brief hopes to make the IPEA methodology widely available in many languages. It adds to the debate about environmental payment for urban services rendered by informal recyclers. It summarizes the IPEA's policy document by a leading waste specialist with his critical assessment. The opinion of the specialist does not necessarily reflect WIEGO's opinion.

A Word about the Naming Debate

The millions of people worldwide who make a living collecting, sorting, recycling, and selling materials that someone else has thrown away are referred to by many different terms in different regions. These include scavengers, recyclers, reclaimers, ragpickers, binners, and waste pickers. At the First World Conference of Waste Pickers, held in Colombia in 2008, a provisional consensus was reached to use the generic term "waste picker" in English (but, in specific contexts, to use the term preferred by the local waste picking community). While an international consensus is still to be reached among activists, waste specialists, MBOs and non-governmental organizations (NGOs), the term waste pickers has been adopted and put into use by WIEGO as a useful generic term that suits the purposes of current global networking. In the contexts where specific terms have been agreed upon WIEGO uses the local term. Brazil has created a specific term in its National Classification of Occupations for the occupation of reclaimer of recyclables – *"catador de material reciclável."* In this Technical Brief we use the Portuguese term "*catador*."

– Sonia Maria Dias, WIEGO's Waste Picker Specialist

[1] For more on this see WIEGO Policy Briefing Note 6 http://wiego.org/sites/wiego.org/files/publications/files/Dias_WIEGO_PB6.pdf

1. Summary of IPEA Study

1.1 Introduction

In 2010 Brazil's Institute of Applied Economics – IPEA[2] – carried out a research study entitled *Pesquisa sobre o Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sólidos.* Its primary objective was to identify the contribution of waste pickers to the environment and to propose instruments for remuneration of this category for services rendered to the environment.

This Brief draws from this research and is divided into two main parts. The present chapter summarizes the main findings from research and the proposed methodology for payment of *catadores*[3] (waste pickers) based on their environmental contribution, void of any additional comments or opinions. The second part includes comments from the author of this Brief.

1.2 Estimate of Economic and Environmental Benefits of Recycling

This section of the study concentrates on giving a value to the potential economic and environmental benefits gained from recycling of urban solid waste. This valorization is based on two principal concepts. First of all, the fraction of solid waste that currently is placed in a landfill of some sort, but that actually could be recycled. This includes iron, aluminum, paper, plastic and glass. For these five main materials, an estimate is calculated of the collected quantities that are currently disposed of in a landfill and not redirected to the processing industry for recycling. Table 1 discusses the methodology used in the study. Secondly, the benefits associated with redirecting these materials for recycling are calculated in R$/t,[4] considering the benefits related to the production process and those related to solid waste management (table 1). The next paragraphs expand on the methodology used to determine the values for each of these benefits as presented in table 2.

Table 1 Analysis Structure for Calculating Economic and Environment Benefits of Recycling

Benefits related to production process (R$/t)		**Benefits related to solid waste management (R$/t)**
Economic benefits	Environment benefits	
One value	• Benefits associated with the reduction of energy consumption • Benefits associated with the reduction of greenhouse emissions • Benefits associated with the reduction in water consumption • Benefits associated with the preservation of biodiversity and non-wooden resources	Benefits associated with waste collection Benefits associated with final disposal of waste

Source: Extracted from IPEA Study.

[2] Instituto de Pesquisa Econômica Aplicada is the original Brazilian-Portuguese name.
[3] See Foreword from WIEGO's Waste Specialist on use of the term *catador*.
[4] 1 R$ = US$0.58627, the mid-market rate at 01 December 2010 per www.xe.com. However, monetary figures in this report are not converted and expressed in US dollars.

Table 2 Estimate of the Economic and Environmental Benefits Generated Through Recycling

Materials	Benefits related to the production process (R$/t)		Benefits (costs) related to solid waste management (R$/t)		Total benefits (R$/t)
	Economic benefits	Environmental benefits	Collection	Final disposal	
Iron	127	74	-136	23	88
Aluminium	2,715	339	-136	23	2,941
Paper cellulose	330	24	-136	23	241
Plastic	1,164	56	-136	23	1,107
Glass	120	11	-136	23	18

Source: IPEA.

1.2.1 The Economic and Environmental Benefits Associated with Recycling

The **economic benefits related to the production process** focus on the cost difference in production of goods using virgin raw materials and that using secondary materials.[5] For five materials, the study considers: the virgin or secondary materials used; the quantity of energy and water consumed; and the amounts of waste generated.[6]

A predetermined intermediate good[7] (which varied per material) was taken as the point of departure, with the assumption made that this intermediate product, fabricated using virgin raw materials, could be substituted by secondary materials without loss of quality to the final product. Table 3 presents the economic benefits related to the production process in R$/t for iron, aluminium, paper cellulose, plastic and glass. For example, in the case of iron the cost estimation of input based on virgin materials was 552 R$/t compared to the costs of input for the production process based on recycling of 425 R$/t, resulting in a net benefit of recycling of 127 R$/t.

Table 3 The Economic Benefits Relation to the Production Process (R$/t)

Materials	Costs of input based on virgin material (R$/t) (A)	Costs of input for the production process based on recycling (R$/t) (B)	Net benefit of recycling (R$/t) C= A-B	Relative net benefit % C/A
Iron	552	425	127	23%
Aluminium	6,162	3,447	2,715	44%
Paper cellulose	687	357	330	48%
Plastic	1,790	626	1,164	65%
Glass	263	143	120	46%

Source: IPEA.

The authors of the study point out that caution should be taken when interpreting the net economic benefits figures presented as they were calculated using multiple assumptions and simplifications.[8]

[5] Detailed calculations, included in an annex to the study, present for each material the costs associated with acquisition of the virgin or secondary material and that of energy and water consumption.
[6] Whenever possible, physical efficiency coefficients related to the Brazilian industrial reality are used.
[7] These were raw steel, primary aluminium, ground wood pulp, plastic resin and white glass.
[8] These should be treated as merely indicative of the magnitude of benefits to be obtained through recycling, and comparison between the different materials should be avoided as, for each, different methodologies and information sources were used.

The **environment benefits calculations related to the production process** to be obtained through recycling fall into four categories (see table 1). The values presented in table 4 are understood to be minimum values, based on conservative calculations for each of the different materials.[9]

Table 4 Estimate of Environmental Benefits Generated Through Recycling

Materials	Generation of energy (R$/t)	Greenhouse gas emissions (R$/t)	Water consumption (R$/t)	Bio diversity (R$/t)	Total (R$/t)
Iron	26	48	<1	<1	74
Aluminium	169	170	<1		339
Paper cellulose	10	9	<1	5	24
Plastic	5	51	<1		56
Glass	3	8	<1		11

Source: IPEA.

One common factor for all five materials is that **benefits associated with the reduction of energy consumption** can be significant since most materials are produced with energy intensive processes when derived from virgin materials. Using recycled materials can reduce these energy needs.

The study uses the assumption that all forms of energy generation create some form of environmental damage. It estimates the amount of environmental damage caused by the energy used to produce both one ton of material derived from virgin raw materials and one ton from recyclables. The difference or net recycling benefit in terms of costs was calculated in R$/t.

The net benefit for recycling **associated with the reduction of greenhouse emissions** was calculated based on the difference between environmental costs of the greenhouse gas emission resulting from production based on primary virgin raw materials, and the environmental costs of the greenhouse gas emissions resulting from recycling. This difference was multiplied with the commercial value of carbon credits from avoided greenhouse gas emissions.

The **benefits associated with water consumption reduction** were established using the volume of water captured from a watershed, the quantity of water actually used and the amount of (waste) water discharged back into the watershed.[10] However, because of lack of data[11] and the minor effect water consumption had on the production process in terms of costs (less than 0.3 R$/t), this factor was not included in the final calculations.

The **benefits associated with the preservation of biodiversity and the use of non-wooden resources** departs from the view point that in the production of (mainly) iron and paper,[12] intensive and extensive use is of made of forested areas with rich biodiversity. By using recycled materials, the loss of these areas and their containing biodiversity would be avoided.

[9] It was noted that comparison between the different materials should be kept to a minimum (or avoided altogether), since the analyses were done using only the information available for each individual material, as there was no consistent information available for all the different materials.

[10] Based on a methodology employed by the Comitê de Integração da Bacia Hidrográfica do Rio Paraíba do Sul (CEIVAP).

[11] Only information on the volume of water captured was available.

[12] The net benefit associated with recycling was not calculated for aluminium, plastic and glass since the extraction of these materials occurs in a more concentrated area.

Benefits (Costs) Related to Solid Waste Management

The **benefits associated with waste collection** consist of the difference in cost (in R$/t) between regular collection services, where all types of waste are collected together, and a collection service of segregated waste. For the latter scenario, limited available data from a CEMPRE study was used, which compared collection costs for 12 municipalities that implemented different collection systems. The costs associated with these different collection systems vary from no additional costs to the municipality (in the case where the *catadores* operate autonomously outside the official municipal system) to 216 R$/t where the *catadores* are contracted and remunerated to cover their actual costs incurred. The authors of the IPEA study opt for the latter option (see the third column in table 2).

For the **benefits associated with final disposal of waste,** the avoided costs of final disposal were examined and used as a parameter. The installations considered for final disposal varied from an open dump with uncontrolled management to a sanitary landfill with the necessary environmental and sanitary precautions included. An average costs per ton incurred by 30 municipalities for final disposal was taken as an indication of the potential costs that would be avoided, if this solid waste was recycled instead of ending up in a final disposal site.

1.2.2 Panorama of Generation of Solid Waste and Final Destination of Recyclables in Brazil

As a second step, the quantities of potentially recyclable materials consumed by society and the current final destination of the urban waste stream were estimated, which will be explained in this section.

The study calculated that in 2009, just over 49 million tons of mixed urban waste was collected,[13] of which it was assumed 100 per cent was disposed of in a landfill of varying sanitary and technical quality.[14] In addition, 1.2 million tons of recyclable materials were gathered through official collection systems of separate waste fractions.[15] It was noted that the recyclable materials recovered through informal (collection) systems[16] was not included in these calculations.

Table 5 Waste Composition, Total Collected Urban Waste and Apparent Consumption per Material

Materials	Waste composition at disposal (%)	Estimated collected waste (thousands of tons / year)	Apparent consumption (thousands of tons / year)	Relation collection / Apparent consumption
Organic wastes	69.6	34,141	ND	ND
Recyclable material	30.4	14,890	39,893	37
Iron	2.1	1,014	22,000	5
Aluminium	0.3	166	919	18
Paper cellulose	14.1	6,934	8,099	86
Plastic	10.7	5,263	5,921	89
Glass	2.3	1,110	2,954	38
Other materials	0.8	403	ND	ND
Total	**100**	**49,031**		

Source: IPEA.

[13] Using data from SNIS (2009). No data was provided as to the actual percentage of generated solid waste that is actually collected.
[14] Including open uncontrolled dumps.
[15] This represents only 2.4% of the total collected urban solid waste.
[16] Which would include a large group of *catadores*.

The data of collected urban solid waste was combined with the information of the composition of the disposed of waste to determine the amount of materials potentially available at the final disposal site for recycling. Table 5 shows that paper cellulose and plastic are the two main fractions of recyclables that arrive at the disposal site. The study compared these data with the apparent consumption data for each of the materials. It explains that although only 37 per cent of the total apparent consumption reaches final disposal, this does not mean that the remaining 63 per cent is actually recycled. Some of it will effectively have been recovered through informal collection systems, but most of these materials are still being consumed and have not come to the end of their useful life, especially in the case of iron and aluminium.

1.2.3 Calculation of the Current and Potential Benefits Generated Through Recycling

As a final exercise the total potential benefits (environmental and economic) generated through recycling was calculated. The study calculated that for 2009, if all recyclable materials that were disposed of had instead been recycled, the (estimated) benefit to society would be slightly over 8 billion R$ expressed in economic terms (table 6). Plastics (72%) and paper (21%) would contribute more than 90 per cent of this total, with the other three accounting for the additional 7 per cent.[17]

Table 6 Estimate of Potential Benefits Generated Through Recycling

Materials	Benefits generated by recycling (R$/ton)	Quantity of materials present in the urban waste stream (thousands of tons)	Total potential benefit (R$ mil)	%
Iron	88	1,014	89,232	1%
Aluminium	2,941	166	488,206	6%
Paper cellulose	241	6,934	1,671,094	21%
Plastic	1,107	5,263	5,826,141	72%
Glass	18	1,110	19,980	<1%
Total			**8,094,653**	**100%**

Source: IPEA.

1.3 Guidelines for Policy for Payment for Urban Environment Service

The second section of the IPEA study assesses different policy options of Payment for Urban Environmental Services (PUES)[18] for Solid Waste Management that would serve two main objectives:

1. enhance the working and living conditions of the *catadores*, considered as the principal actors in material recovery in Brazil;
2. enhance the recovery of recyclable materials in Brazil, thus aiming to redirect a fraction of recyclables to the processing industry.

1.3.1 Introduction

As part of the inception phase of the project, a workshop was held with technical staff from IPEA and the Secretary of Water Resources and Urban Environment from the Ministry of Environment (MMA) to define the problem tree at the root of the PUES and to orientate the PUES design.

[17] The author of the Briefing Note added the final right column to the table to includes these percentages.
[18] PSAU in accordance with the Portuguese concept: Pagamento por Serviços Ambientais Urbanos

As a starting point for constructing the problem tree, staff members of the MMA indicated that the policy should be based on three main hypothesis:

1. The policy should focus on the payment of urban services.
2. The services in question should be associated with the recycling of urban solid waste.
3. The beneficiaries of the payment for the urban environment services should be the *catadores* of recyclable materials.[19]

As a result, two sets of problems emerged that the PUES should address (see figure 1):

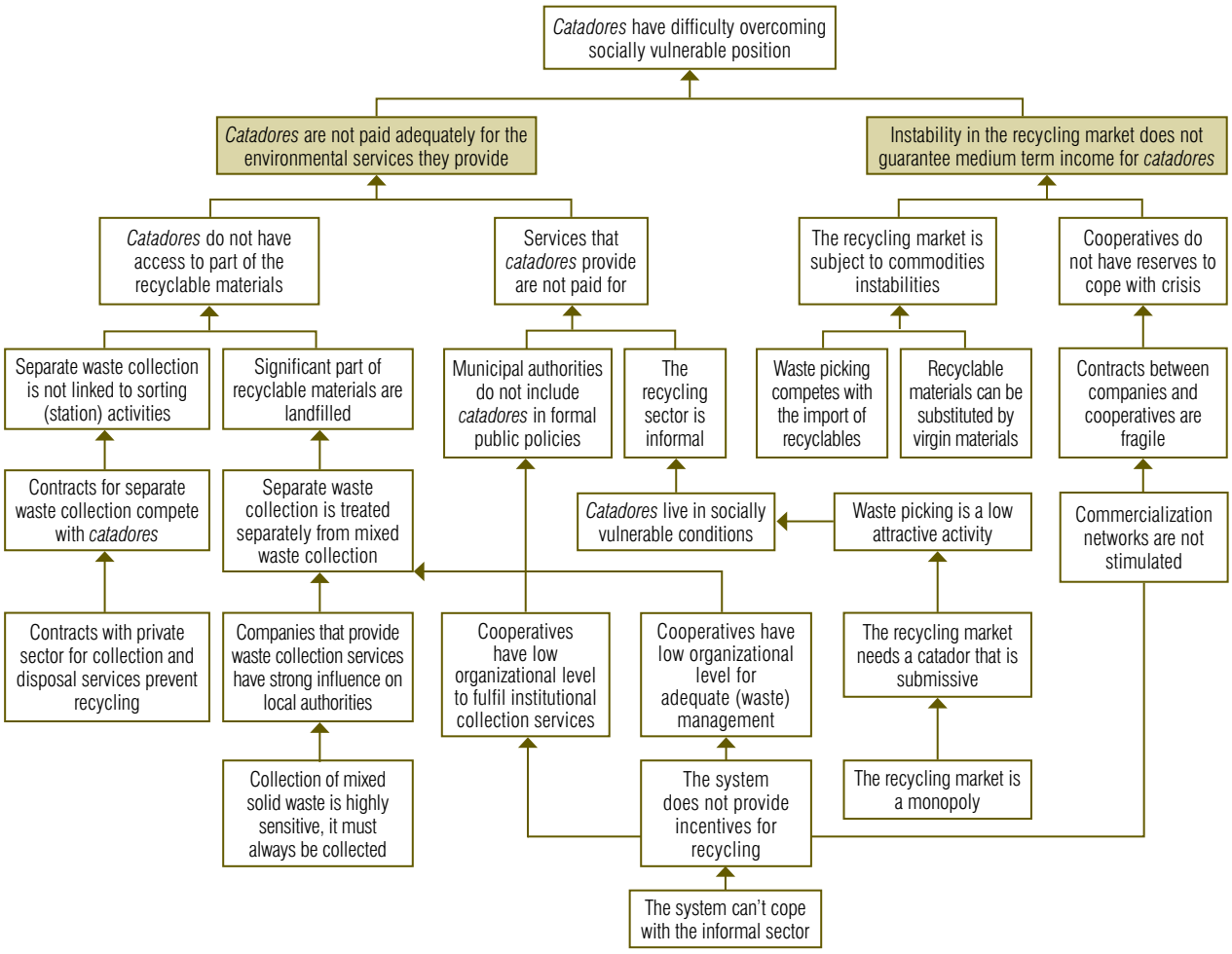
1. The average income that the *catadores* receive is considered inadequate for the services they provide.
2. This income is very unstable due to price fluctuations of recyclables.

Two causes were identified that lie at the root of the low income that *catadores* receive:

- Because their work is unknown and often unrecognized, no official payment system exists.
- The *catadores* only recover partially the quantity of recyclables potentially available in the urban waste stream; the majority of these materials end up in the landfill.

On the other hand, the price instability of recyclables is largely due to the fact that recyclables are subject to (international) commodities markets.

Figure 1 Problem Tree of the PUES Policy for Recycling



Source: IPEA, translated version from the original in Portuguese.

[19] It was, however, recognized that other actors including junk shop dealers, intermediaries, the recycling industry, and municipalities all contribute to the provision of a environmental recycling service.

Two additional factors were identified that weaken the position of the *catadores*, which should be addressed when defining the PUES:

1. The low administrative capacity of *catadores* cooperatives limit the possibility of being considered by municipalities for collection of recyclables contracting.
2. Widespread informality characterizes the sector of *catadores*.

Through the implementation of a system of Payment for Urban Environmental Services (PUES), the activities of the *catadores* would be formally recognized and this should lead to greater income (stability) for the *catadores*. The policy document explores three proposals of complementary instruments to implement PUES, which are detailed in the next paragraphs, namely:

1. payment based on productivity;
2. gradual compensatory additions (increase);
3. a cooperative fund.

1.3.2 Proposal for Instrument 1: Payment Based on Productivity

One option to combat the low monthly income of the *catadores* would be to compensate all *catadores* with a fixed income for their activities. However, as argued by the study's authors, given the diverse nature of the cooperatives both in terms of level of organization, productivity, financial status, and specialization, this would lead to market distortion, misunderstanding (and possible conflicts) among the cooperatives and possibly low efficiency in the actual recovery of materials.

Instead, the proposed instrument of *payment based on productivity* should be based on a uniform payment in accordance with the actual physical productivity (materials recovered). The researchers opt for this parameter because, they argue:

a) physical efficiencies can be easily calculated, by weighing the actual materials separated (and baled);
b) the physical productivity depends only on individual productivity and that of the organization.

The objective would be to remunerate in an effective and permanent manner the *catadores* for their services of collecting (picking) and sorting urban recyclables.[20]

Description of the Instrument

The instrument consists of periodic payments to the cooperatives of *catadores* per ton of recyclables collected (and sorted) – independent of the value of the material collected – based on the provision of this environmental service.

Payment would be in accordance with the actual productivity of each cooperative, and four categories of efficiency are proposed.[21] Based on this classification, different values for payment per ton would be established to be paid to each group (of cooperatives), which take the following assumptions into account:

1. The amount to be paid per ton should increase as the productivity per capita of the cooperative decreases. This is to stimulate especially those less-organized cooperatives to improve their organizational skills and to increase their productivity.[22]
2. The average value to be paid to each *catador* should increase as the productivity per capita of the cooperative he/she belongs to increases.

[20] This payment is justified because of the reduction of negative externalities related to production, consumption and final disposal of commodities.
[21] These categories are based on analysis done of the efficiency in recovery and sorting activities of 3,503 *catadores* working in 71 cooperatives.
[22] It is not the researcher's intent that this be interpreted as rewarding those with low productivity.

Table 7 provides an example of how this instrument would work. The classification is done according to the relative efficiency of the cooperatives in the recovery of materials expressed in kg/*catador*/month.

Table 7 Illustration of the Option of Payment According to Productivity

Relative efficiency	No. Of members (associates) of cooperatives	Total production (t)	Base values (R$/t)	Global values transferred to cooperative (R$)	Value received per catador (R$)
High efficiency	100	2,600	10	2,600,000	260
Medium efficiency	100	1,400	15	2,100,000	210
Low efficiency	100	600	30	1,800,000	180
Very low efficiency	100	230	50	1,150,000	115

Source: IPEA and Primary (field) data from the Damásio research (2006, 2007, 2009).

As the example illustrates, cooperatives with a high efficiency would receive a higher value per associate (*catador*), in comparison with those cooperatives with a lower efficiency. At the same time, it is foreseen that cooperatives with a lower level of efficiency would be stimulated to dedicate time to improving their internal organization, leading to an increase in productivity and improved efficiency.

Limitations

The study identifies a number of possible limitations to this instrument that need to be overcome, including:

1. It does not apply to those *catadores* who are not associated or are members of a cooperative and as such, the majority of the current *catadores* would be excluded. This would be a deliberate choice, motivated by the short term reduced implementation and monitoring costs, and providing medium term incentives for the *catadores* to organize themselves.

2. There is no differentiation in payment per type of material collected. This is not considered ideal, because the pollution created by each material is different and the PUES should reflect this somehow. Furthermore, the market already provides differentiated incentives for collecting different materials, which should be taken into consideration.

3. A combination of excessive payment and insufficient demand for recyclables could generate an excess in recyclables, which could lead to problems of sanitation and high(er) storage costs.

4. There is a possibility that depending on the asymmetry of the market forces between members of cooperatives, *sucateiros* and *recicladores*, the PUES payment could lead to a decline in market prices paid to the cooperatives. In this case, cooperatives (members) could receive the same (final) income as prior to introduction of PSAU. The PUES could possibly end up benefiting other actors (links) in the recycling chain more than the *catadores*.

5. Currently the price of the recyclable materials varies per region, and could lead to conflicts among cooperatives of *catadores.*

6. Classification of the cooperatives according to productivity efficiency remains a theoretical exercise. Putting the instrument (and the classification) into practice would require consultation with the *catadores* and their cooperatives.

1.3.3 Proposal for Instrument 2: Regulated Compensating Increments

The main objective of this complementary policy instrument is to correct the price system in times of crisis, but also to incentivize cooperatives to collect recyclable materials that would normally not be economically attractive to collect (due to the low selling prices).

Since it is considered difficult to implement a (traditional) minimum price system in Brazil, a variant is proposed that would entail applying a multiplier factor per type of material to the productivity payment instrument. It is argued that given the nature of the (national) recycling market, a number of restrictions would be encountered, because an effective minimum price system for recycling materials would require that:

- The public sector should be willing and able to purchase any surplus material, when the price of certain materials descends below the minimum price.
- The public sector should have access to sufficient infrastructure to store excess stock.
- The system is robust enough to deal with the homogeneity of the recycling material market characterized by a variety of materials sold in different qualities that relate to cleanliness and compaction.
- An effective monitoring system for the prices and production should be in place.

In addition, the geographic reality of Brazil means that transportation costs have a significant impact on the prices of recyclable materials.

Description of the Instrument

The value of PUES paid per ton of collected material, as determined by the productivity payment instrument, is multiplied by a factor, established for each recyclable material. Although no numerical example is given, research explains that this multiplier factor can be created based on two basic (non-excluding) objectives:

- **Anti-cyclic compensations:** In times of crisis, with strong commodity price fluctuations related to the recyclables collected by the *catadores*, the multiplier can be regulated for those materials (most) affected by the crisis, creating compensating increases to maintain collection levels of recyclable materials and guarantee the provision of environmental services, and as such, to avoid substantial income losses for the *catadores*.
- **Regulated incentives for normal times:** The multiplier can be used to stimulate on an individual level collection, sorting and processing of certain groups of recyclable materials (considered a priority by the environmental authority) either because of its polluting potential, or the low registered collection and recycling levels.

The researchers expect that the public sector can use the instrument to steer towards the collection of recyclable materials that would normally not be collected and similarly that the instrument should provide certain stability in income of *catadores* and in quantities of collected materials in times when prices are very low.

Limitations

Similar limitations of the instrument are presented as for the productivity payment instrument, which include foreseen risk of over-collection of certain materials, possible reduction of the market price of certain materials, and a possible significant regional variation in the values set for the PUES and the prices of recyclables.

In addition, as monitoring the prices of all types of materials would be too costly, focusing on certain materials could have a distorting effect on the market. And the implementation of an obligatory monitoring system would bring (high) costs with it.

1.3.4 Proposal for Instrument 3: Cooperative Fund

This instrument seeks to complement the previously described instruments, both of which entail the direct payment to the cooperatives and probably directly to the *catadores* without any funds being reinvested to strengthen the structural weaknesses found in most of the cooperatives. By creating a Cooperative Fund it is anticipated that critical issues such as scarcity of machines, low levels of organization and a lack of reserves to endure times of price instability can be addressed, leading to an improvement in the long run for the *catadores* and their cooperatives. This would also allow them to enhance their chances of being contracted by municipalities to provide urban environmental services.

The main objective of the fund is to reduce the vulnerability of the cooperatives of *catadores*.

The fund is proposed to be used for a wide range of activities, to be further defined with the cooperatives and the technical assistance teams, but could include:

- training and teaching programs for the cooperatives in topics such as reading and writing, maths, administration and computer skills
- creation of networks of commercialization to strengthen the negotiation position of the cooperatives to be able to respond to the demands from industry regarding minimum quantities and qualities of the materials sold to them
- acquisition of machinery and equipment including balers, carts or trucks that would improve the quality of work of the *catadores*
- availability of stock financing so cooperatives have a (larger) working capital to be able to finance their daily activities without the need to sell materials on a daily basis, which can be negative in times of financial crisis

Description of the Instrument

The cooperative fund can be operated by any public bank, and is proposed to be agile and flexible in its execution to meet the varying and diverse needs of the cooperatives.

A number of complementary proposals are presented in the study, such as:

- to allow cooperatives to buy (on a voluntary basis) fund shares, and as such guarantee their right to have access to (larger) investments and loans
- to make participation in the fund a condition on the receipt of payment
- to define whether the beneficiaries of the fund are exclusively the cooperatives or whether to include individual *catadores* as well

Limitations

The limitations and challenges anticipated in the study that would affect the cooperative fund are very diverse and directly related to the institutional design selected. A fundamental challenge to be overcome is to create a harmonious management of the fund involving two very diverse groups of actors, public sector and cooperatives of *catadores.* Such a design could prove to be very complex to be functional. Secondly, there are risks of low repayment of loans or delays in payment.

As such it will be necessary to develop strategies that address the wide regional diversity and the variety of degree of organization among the *catadores.*

1.3.5 Final Note on the IPEA Study

The study does not include a concluding section that compares the instruments presented, proposes further steps to be undertaken or links the section on estimating the economic and environmental benefits with the three policy instruments presented. As such this section could not be included in the Brief.

2. Opinion of Author of this Brief

2.1 Introduction

The study on different scenarios for Payment for Urban Environmental Services (PUES)[23] prepared by the IPEA in 2010 is an important policy document that seriously addresses the topic of recycling and how the involvement of the *catadores* in Brazil can be formalized through this payment. It is a significant move to recognize the role the *catadores* have played (and continue to play) in the recycling (and solid waste) sector in Brazil. This recognition and the exercise of building scenarios presented in the study are coherent with the favourable position towards *catadores* expressed and regulated in the National Solid Waste Policy[24] approved in late 2010. Article 8 of Chapter III of the PNRS presents as one of its key instruments in incise IV:

> *the incentive to create and/or develop cooperatives (or other forms of association) of catadores of reusable and recyclable materials*[25]

With the intention of enhancing the study that was prepared and contributing to the scenario building initiated by the MMA through the IPEA, the next section offers a number of constructive comments on the actual study.

2.2 General Comments

In calculating the potential benefits of recycling, the study only focuses on those materials currently not recycled, and does not include the quantity of recyclables of each of the five fractions which are presently recovered and recycled, either through formal or informal collection systems. Not only should this decision be explained, it would be better to include all potential recyclable materials in the benefit calculations.

No motivation is given as to why the composition of recyclables is not based on characterization studies at the point of generation, but instead on the composition of the waste that arrives at the final disposal site.[26]

When computing the amount of recyclable materials collected currently, only the official collection system is considered and those recyclables collected through informal channels are not included. This seems rather odd, since the policy intends specifically to incorporate the informal actors.

2.3 Comments Related to Benefits Calculation

The first section of the study presents a detailed estimation of the economic and environmental benefits that can be obtained from redirecting the recyclable materials that currently are subject to final disposal. Critical examination of these two main categories, their relative contribution to the totals calculated, and how they are determined, reveal that:

- Paper and plastics contribute 93 per cent to the total estimated benefit of recycling (table 8).
- The environmental benefits expressed in economic terms are the minimum and do not compensate for the additional costs incurred due to collection of separate fractions of recyclables (table 9).[27]
- As a consequence, the benefits calculated for each of the materials are (almost entirely) economic benefits and, specifically, those associated with the production process.

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[23] PSAU in accordance with the Portuguese concept: Pagamento por Serviços Ambientais Urbanos.
[24] LEI Nº 12.305, DE 2 DE AGOSTO DE 2010 DOU 03.08.2010 Institui a Política Nacional de Resíduos Sólidos.
[25] In Portuguese: IV - o incentivo à criação e ao desenvolvimento de cooperativas ou de outras formas de associação de *catadores* de materiais reutilizáveis e recicláveis.
[26] Part of this waste is actually recovered and sold to the recycling process, which is not included in the study.
[27] Except in the case of aluminium.

- For each of the five materials, the predominant contributing factor[28] in calculating the cost difference of the two different production processes is the cost of the natural resources; either as primary raw material or recycled/secondary material (table 10).

- The costs of the secondary material are based on the average prices the *catadores* receive for the different materials, according to information from CEMPRE (2007). The range of prices of each material varies hugely and it is not explained what criteria were used for computing these average values.[29]

- Furthermore, no mention was made in the original source whether the materials were sold directly to the industry processing the secondary materials or whether they were sold to intermediaries. This distinction is very important and should have been clarified in the study.[30]

Table 8 Estimate of Potential Benefits Generated Through Recycling

Materials	Benefits generated by recycling (R$/t)	Quantity of materials present in the urban waste stream (thousands of tons)	Total potential benefit (R$ mil)	%
Iron	88	1,014	89,232	1%
Aluminium	2,941	166	488,206	6%
Paper cellulose	241	6,934	1,671,094	21%
Plastic	1,107	5,263	5,826,141	72%
Glass	18	1,110	19,980	0%
Total			**8,094,653**	**100%**

Source: Based on study of IPEA.

Table 9 Estimate of the Economic and Environmental Benefits Generated Through Recycling

Materials	Benefits related to the production process (R$/t)		Benefits (costs) related to solid waste management (R$/t)		Total benefits (R$/t)	Total benefits not including economic benefits (R$/t)
	Economic benefits (A)	Environmental benefits (B)	Collection (C)	Final disposal (D)		C – (B+D)
Iron	127	74	-136	23	88	-39
Aluminium	2,715	339	-136	23	2,941	226
Paper cellulose	330	24	-136	23	241	-89
Plastic	1,164	56	-136	23	1,107	-57
Glass	120	11	-136	23	18	-102

Source: Based on study of IPEA.

[28] Water and energy are the other factors included in the calculations of IPEA.
[29] For instance, for plastic an average value of 602 R$/t was used, while the prices cited in the table range from 100 R$/t (for Plastic Longa Vida baled and clean in Mato Grosso do Sul) to 1,300 R$/t (baled PET in Paulina, Sao Paulo).
[30] If the materials were not sold directly to the industry, but first to an intermediary, then the final cost of that material bought by the industry would be higher than the value used.

Table 10 Comparison Between Cost Structures for the Five Materials Based on Primary Production Process and Based on Recycled Materials

Material		Avoided costs to generated 1 ton of material based primary raw materials				Costs to generate 1 ton of recycled material			
		Water	Energy	Natural Resources	Total	Water	Energy	Secondary material	Total
Iron	R$/t	10.77	45.56	465.9	**522.23**	6.46	184.09	234.55	**425.10**
	%	2%	9%	89%	**100%**	2%	43%	55%	**100%**
Aluminium	R$/t	25.05	4602.11	1535.12	**6162.28**	10.02	186.76	3250.71	**3447.49**
	%	0%	75%	25%	**100%**	0%	5%	94%	**100%**
Paper (cellulose)	R$/t	32.55	184.09	470.69	**687.33**	23.48	54.34	278.98	**356.80**
	%	5%	27%	68%	**100%**	7%	15%	78%	**100%**
Plastics	R$/t	1.57	122.69	1665.66	**1789.92**	1.2	23.16	602.37	**626.73**
	%	0%	7%	93%	**100%**	0%	4%	96%	**100%**
Glass	R$/t	0.8	102.18	159.55	**262.53**	0.4	25.46	116.89	**142.75**
	%	0%	39%	61%	**100%**	0%	18%	82%	**100%**

Source: Based on Annex 1 of the IPEA study.

This skewed composition of the total benefits calculated, and the predominance of plastic (and to a lesser extent of paper), means that it is crucial to understand the importance of these materials. A number of aspects need to be considered and perhaps further investigated:

- What is the quality of the paper and plastics that arrive at the landfill, and to what degree can they be recycled and would they have an economic value?

- Plastic, and to a certain degree paper, is not a homogenous material and is characterized by a large variety of types of plastics with different properties. Each of these types has a different potential for recycling, including certain plastics which cannot be recycled. In addition, the economic benefits of recycling of each of these plastic types vary, in accordance with the costs associated with primary production process and the costs associated with their production through the recycling process. It would be important to segregate the fraction plastic into (at least) the main sub-categories (starting with the seven categories commonly used) and determine for each of these categories the benefits generated by recycling and the proportion of the quantity found at the disposal site. This is especially significant because the cost of producing both recycled plastic and plastic made from virgin raw materials is primarily determined by the costs of the raw materials, which account for 95 per cent (the remaining 5 per cent is for water and energy).

- For the fraction paper, this might also be a useful exercise.

2.4 Comments on Policy Instruments Proposed

The proposed *payment according to productivity* seeks to stimulate cooperatives with low efficiency to increase their efficiency. For this purpose, four categories of efficiency are included, measured in the number of kg/*catador*/month. It is stated that the instrument does not seek to reward cooperatives with low efficiency, and it includes an example to demonstrate that the value received per *catador* increases as the efficiency of the cooperative increases and more recyclables are recovered.

Table 11 Example to Illustrate the Option of Payment According to Productivity

Relative efficiency	kg/*catador*/ month	Members (associates) of cooperatives	Total monthly production (t)	Base values (R$/t)	Global values transferred to cooperative	Value received per catador (R$)
High efficiency	> 1800	100	2,600	10	26,000.00	260
Medium efficiency	between 1100 and 1800	100	1,400	15	21,000.00	210
Low efficiency	between 550 and 1100	100	600	30	18,000.00	180
Very low efficiency	< 550	100	230	50	11,500.00	115

Source: Primary (field) data from the Damásio research (2006, 2007, 2009).

However, the examples of monthly production used for each of the efficiency categories can be misleading. It is important to consider the ranges of values used for each category (the second column from the left) and analyze the effect it has if it goes from one efficiency category to the next. That is, for instance, what consequences does it have for a cooperative to increase their productivity from 500 tons per month to 550 tons per month, moving from operating as a *very low efficiency* to operating as a *low efficiency* cooperative?

Considering the base values proposed, the cooperative would actually receive less income although it was recovering more recyclables, as is seen in table 12. The average value received per *catador* would also decrease from 250 R$ to 165 R$ per month.

Table 12 Example to Illustrate Importance of Base Values Chosen for Each Efficiency Category

Relative efficiency	kg/catador/ month	Members (associates) of cooperatives	Total monthly production (t)	Base values (R$/t)	Global values transferred to cooperative	Value received per catador (R$)
Low efficiency	between 550 and 1100	100	550	30	16.500,00	165
Very low efficiency	< 550	100	500	50	25.000,00	250

Source: Author of the Brief, using data from the IPEA study.

This situation repeats itself for the other categories as well. As can be seen in figure 2, it is not beneficial actually to increase the efficiency, to go from one efficiency category to a higher one.

Based on the proposed base values, it is more beneficial to produce between 350 and 500 t/month, or make a jump to between 950 and 1050 t/month. The current proposal can lead to a number of things happening:

- Cooperatives with (very) low efficiency will only increase their efficiency to above 350 t/month, but not above 550 kg/t, or decide to make jump to around 1000 t/month.
- Cooperatives might decide not to report their production in excess of t/month.
- Cooperatives might decide to split up and as such each stay below t/month.

- The amount of recyclables recovered would actually not increase as it is not beneficial to increase productivity.
- The costs of this instrument would increase and the cost per ton recovered would also increase.

This means that the instrument would actually be counterproductive. The reason behind this happening lies in the ratio structure used in determining the base values, currently five times as high between the lowest category and the highest category.

The example presented in table 13 shows the effects of changing this ratio, to for instance 25, 30, 35 and 40 R$/t. As can be seen in the graph below, an increase in efficiency would in fact be rewarded, whereby making the switch from one category to the next category would quickly lead to improved benefits. The exact ratios to be used would need to be calculated and would depend also on:

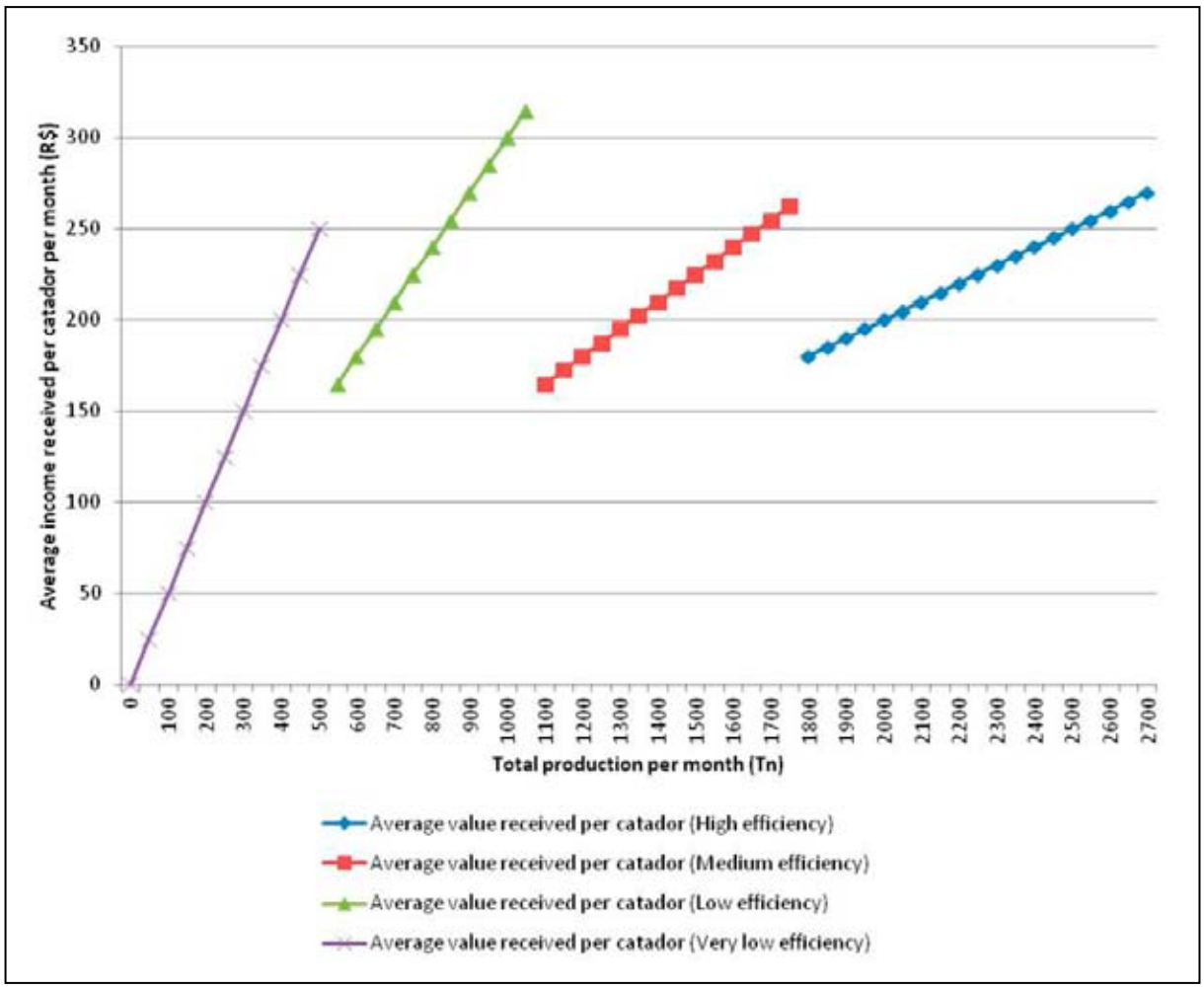
- the amount of funds available to finance this instrument
- the minimum price per ton that would be paid (for the highest efficiency category)
- the current distribution of cooperatives among the efficiency categories

Table 13 Example to Illustrate the Option of Payment According to Productivity with Modified Base Values to be Paid for Each Efficiency Category

Relative efficiency	kg/catador/ month	Members (associates) of cooperatives	Total production (t)	Base values (R$/t)	Global values transferred to cooperative	Value received per catador
High efficiency	> 1800	100	2,600	25	65,000.00	650
Medium efficiency	between 1100 and 1800	100	1,400	30	42,000.00	420
Low efficiency	between 550 and 1100	100	600	35	21,000.00	210
Very low efficiency	< 550	100	230	40	9,200.00	92
Total			**4,830**		**137,200**	

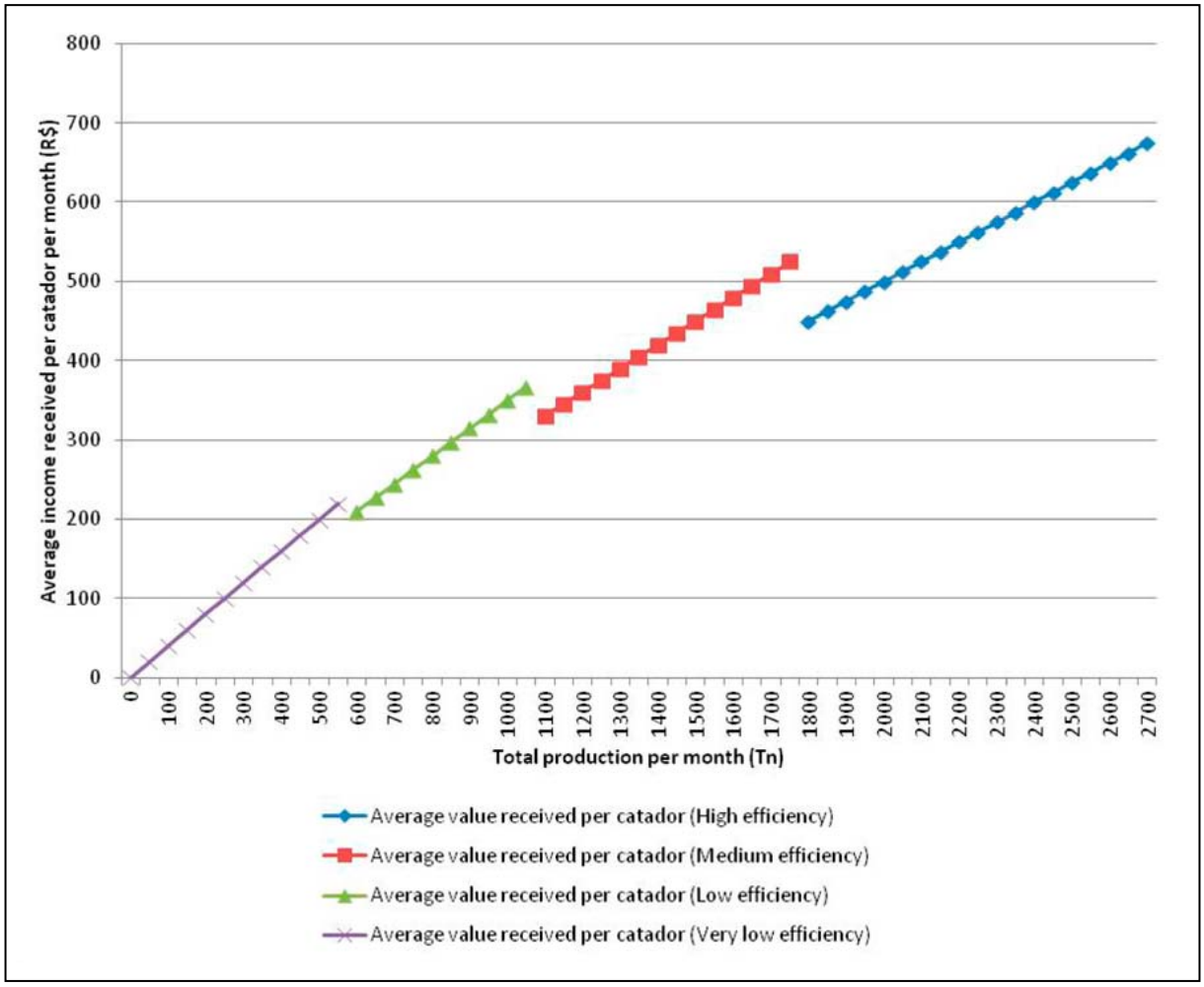
Source: Author of the Brief, using data from the IPEA study.

Figure 2 Example to Illustrate Importance of Base Values Chosen for Each Efficiency Category



Source: Author of the Brief, using data from the IPEA study.

Figure 3 Example to Illustrate the Option of Payment According to Productivity with Modified Base Values to be Paid For Each Efficiency Category



Source: Author of the Brief, using data from the IPEA study.

3. Final Reflections

As a final reflection the following issues will be addressed:

- the value of the 8 billion R$ given to the benefits of recycling
- an estimate of the costs of the environmental urban services

3.1 Value of 8 Billion R$

The objective of establishing this amount (fund) of 8 billion R$ is to give a value to benefits that can be obtained from the fraction of recyclable materials in the waste stream currently deposited at the landfill, and which could be re-directed to industry to incorporate in the manufacturing process.

The impression is created that this fraction of recyclables is worth 8 billion R$, which would be the basis for financing the PUES. However, extreme care should be taken with this premise, because:

1. This 8 billion R$ does not actually exist.
2. Even if it were possible to create this 8 billion R$, how would these funds then be captured and transferred to the final beneficiaries (supposedly the *catadores*)?

Let's first explore the fact that the 8 billion R$ does not actually exist. For this amount to exist, the industry would need to pay the same price for the recycled materials as they are currently paying for the raw (virgin) materials. Whether this is a realistic assumption remains to be seen. It probably is not. Alternatively, the public sector would need to cover the difference in costs, i.e. subsidize the collection of recyclables based on the costs of the production process using raw materials.

It would also require that instruments proposed to channel the payment of the PUES be based on this very uncertain assumption, which could lead to financial risks and unrealistic expectations.

This is even more true because the estimated 8 billion R$ consists of more than 93 per cent (if not nearly 100 per cent) of the economic benefits related to the production process of two materials: plastic and paper. Therefore, as mentioned before, it is crucial to understand these materials better.

Instead of looking at the potential benefits, it might be more prudent to base the value of the PUES on the costs related to the actual (urban environmental) service provided – that is, the provision of recyclable materials that serve as input for the industrial process, through a process, primarily, of collection of recyclables and a number of preparatory handlings (sorting, washing, baling). These costs, need to be estimated and financed.

3.2 Costs Analysis of Actual Costs of Providing the Urban Environmental Service

It is important to get an indication of what the minimum costs would be associated with recovering the fraction of recyclables that currently go to final disposal and should be redirected to the processing industry. For this purpose, the following steps are followed to estimate the costs presented in table 14 and table 15:

Step 1: According to *tabela* 18 of the IPEA study, the quantity of recyclables to recover from final disposal are 14,890,000 t/year.

Step 2: Supposedly these 14,890,000 tons will be collected by the *catadores.* Based on the different efficiency rates proposed by IPEA (varying between 250 – 1800 kg/*catador*/month), this means that an

estimated 700,000 – 5 million *catadores* would be needed to recover these materials. This would in fact be additional *catadores*, because in the calculations of IPEA the current amount of recyclables recovered by *catadores* (and thus not going to final disposal) is not included.

Step 3: If the main objective is to officially recognize the work of the *catadores* and ensure a stable income, it only seems logical that they should receive at least a monthly salary of 1 SM (minimum salary). That is R$ 622/month. However, to this R$ 622/month all the legal provisions should be added, coming to a total of R$ 1,305/month per *catador*.

Step 4: This means that in order to collect all the recyclables that currently go to final disposal, the salary costs would be at least 10.8 billion R$ (based on *maximum efficiency* and 1 SM). This does not include any other (operating) costs.

Table 14 Total Salary Costs to Recover All Recyclables that Go to Final Disposal (Without Taxes)

Relative efficiency	Average productivity		Number of *catadores* required	Minimum salary without taxes		
	kg/*catador*/ month	kg/*catador*/ year		1 MS R$ 622	2 MS R$ 1244	3 MS R$ 1866
High efficiency	1800	21,600	689,352	5,145,322,222	10,290,644,444	15,435,966,666
Medium efficiency	1100	13,200	1,128,030	8,419,618,182	16,839,236,363	25,258,854,545
Low efficiency	550	6,600	2,256,061	16,839,236,364	33,678,472,727	50,517,709,090
Very low efficiency	250	3,000	4,963,333	37,046,320,000	74,092,640,000	111,138,960,000

Source: Author of the Brief, using data from the IPEA study.

Table 15 Total Salary Costs to Recover All Recyclables that Go to Final Disposal (With Taxes)

Relative efficiency	Average productivity		Number of *catadores* required	Minimum salary with taxes		
	kg/*catador*/ month	kg/*catador*/ year		1 MS R$ 1305	2 MS R$ 2406	3 MS R$ 3507
High efficiency	1800	21.600	689.352	10,795,250,000	19,902,966,666	29,010,683,333
Medium efficiency	1100	13.200	1.128.030	17,664,954,545	32,568,490,909	47,472,027,272
Low efficiency	550	6.600	2.256.061	35,329,909,091	65,136,981,818	94,944,054,545
Very low efficiency	250	3.000	4.963.333	77,725,800,000	143,301,360,000	208,876,920,000

Notes: 1. This includes all the required taxes per law: INSS = 57.6%; FGTS = 8%; 13th month = 8.3%; holidays = 2.78%; additional for unhealthy work = 204 R$/month.

Source: Author of the Brief, using data from the IPEA study.

This first rough estimate leads to the following reflections:

1. How will these 10.8 billion R$ be financed? Is it realistic to assume that the processing industry is willing to pay this amount?

2. How does this compare to the environmental and economic benefits calculated of 8 billion R$?

3. How does this amount compare to the annual budget of MMA, which according to the IPEA study, was between 2 and 3 billions R$.

4. How can efficiency be increased even further?

5. How many *catadores* are there actually who could perform the recovery activity at the required efficiency rates?

6. How serious is the objective of making the work of *catadores* official and dignified work? The calculations in the IPEA study give an indication only of max 260 R$/*catador*/month to be paid. Why should a qualified person working in the environmental service only receive 1 minimum salary? Why not two? Why not three?

3.3 Structure of the Fund to be Used for Payment of PUES

There are also a number of other issues that need to be addressed related to financing the PUES and channeling the funds associated with the payment of PSAU. These include:

- Can the avoided costs actually be translated into funds that can be transferred? And if so, is this possible for all the identified potential benefits, or only for some?

- Assuming that these avoided costs (and benefits) can be made payable, how are they transferred to the payment of the PSAU?

- Who controls this fund associated with the payment of the PSAU?

- Who is accountable for this fund?

- How do you guarantee that this fund is actually directed to the final beneficiaries, and not used for other purposes or for other beneficiaries?

- How can possible corruption be mitigated, given the attraction a fund of 8 R$ billion can have?

Finally, in light of the favourable position taken towards the integration of *catadores* within solid waste management in Brazil in a number of national and federal policy documents, it is important to deepen the discussions initiated in the IPEA study, and develop further the main scenarios set out in the study. The following steps could be beneficial to consider:

- Related to the benefits calculation, do a more in-depth analysis of the contribution of each of the different types of plastics and types of paper, taking into consideration also the composition of the types of plastics (and paper) that currently arrive at the landfill.

- Related to the policy instrument *payment according to productivity*, revise the base values proposed and create different scenarios of base values to determine whether improved efficiency is actually rewarded.

- Establish what should be the minimum to be earned per *catador* as a basis for any of the proposed instruments.
- Establish what should be the maximum number of *catadores* who should be included in the system.
- Establish the minimum number of *catadores* that could be financed based on the benefits calculation.
- Define how the *virtual* benefits from recycling (estimated at 8 billion R$) can actually be created and how this fund will be transferred to the end beneficiaries, i.e. the *catadores*.
- Define whether the fund is based purely on the prices for commodities established by world market prices, or whether there will be some form of public intervention to establish minimum prices.
- In case there is some form of public intervention, define what is the maximum amount that can be subsidized and what the criteria are to be used.
- Define who manages this fund, including rules for accountability and measures to mitigate corruptions.
- Define the role of the public sector (including national, federal and municipal level) in the transfer and management of the fund.
- Define the role of the (recycling) industry in the transfer and management of the fund.
- Define whether only organized *catadores* are eligible for the proposed instruments of the PSAU, and what will happen to those *catadores* who are no affiliated to any type of organization.

3.4 Closing Words

Finally, as was stated at the outset of this section, the study of the IPEA analyzed in this Urban Policies Technical Brief is an important contribution to the current discussion taking place in Brazil on how to formalize the involvement of the *catadores*. The analysis and building of scenarios discussed serves as an important tool at the national level in Brazil. At the same time, they can be of benefit to the discussion taking place in those countries that are also seeking to create formal financing mechanisms that recognize the valuable work of the informal recyclers.

About Inclusive Cities: The Inclusive Cities project aims to strengthen membership-based organizations (MBOs) of the working poor in the areas of organizing, policy analysis and advocacy, in order to ensure that urban informal workers have the tools necessary to make themselves heard within urban planning processes. Inclusive Cities is a collaboration between MBOs of the working poor, international alliances of MBOs and those supporting the work of MBOs. For more information visit: www.inclusivecities.org.

About WIEGO: Women in Informal Employment: Globalizing and Organizing is a global research-policy-action network that seeks to improve the status of the working poor, especially women, in the informal economy. WIEGO builds alliances with, and draws its membership from, three constituencies: membership-based organizations of informal workers, researchers and statisticians working on the informal economy, and professionals from development agencies interested in the informal economy. WIEGO pursues its objectives by helping to build and strengthen networks of informal worker organizations; undertaking policy analysis, statistical research and data analysis on the informal economy; providing policy advice and convening policy dialogues on the informal economy; and documenting and disseminating good practice in support of the informal workforce. For more information visit: www.wiego.org.