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PRELIMINARY EVALUATION OF THE PROGRAM GOALS FOR RECYCLED SOLID WASTE IN THE SÃO PAULO MUNICIPALITY, BRAZIL

Municipal solid waste recycling in developing countries, such as Brazil, is fundamental for methane gas emissions minimization from landfills and dumps, reduced extraction of natural resources, water and soil contamination reduction, and improvement of the socio-economic conditions of waste pickers.

In 2014, São Paulo published the Municipal Solid Waste Integrated Plan that defined the goals with an inclusive approach regarding the National Waste Pickers movement. The targets for 2016 were: 1. to recycle 3,000 tons per day from selective collection; 2. to cover 100% of the city area with selective collection.

The objective of this paper is to evaluate the achievements of the goals for recycled solid waste, and to identify those regions that mostly contributed to it.

The amount of generated and selectively collected waste per month and year by regions was obtained from the Municipal Solid Waste Control System (PMSF, 2014).

In 2016, São Paulo had a population of 12,038,175 inhabitants and produced 5.2 million tons of solid waste (8% of Brazilian total). 68% was household waste, more than 90% was landfilled, and 2.36% was selectively collected for recycling.

The public selective waste collection of recyclable residential waste (papers, plastics, glass, and metals) is executed by: (i) two outsourced firms that collect door to door; (ii) 21 sorting centers operated by associations of waste pickers that have an agreement with the municipal government, and 20 associations of waste pickers without an agreement with the municipality.

The selective collection of recycled waste in São Paulo is carried out separately from the regular collection and does not cover all households and streets. No specific law mandates citizens to sort their waste in the generation sites and

the expenses with the cleaning services are computed into the urban property and territorial tax.

Results demonstrated that São Paulo did not reach the targets for 2016. Only 84,652 tons of waste (2.36% of the total) were collected and recycled in 2016. The highest percentage of recyclable solid waste recovery was 10% in the region of Vila Mariana that has the highest family income. In the peripheral areas of Sao Paulo, the percentages of household recyclable solid waste recovery were much lower.

Regions with the greatest generation of household waste were not necessarily the regions with the most significant recycling rates (Table 1). Therefore, the actions for improving the recycling rates of household dry waste could be: (i) to prioritize the top 10 regions that generate more recyclable household waste and (ii), under the socio-environmental perspective, to carry out priority actions in the peripheral areas of the city inhabited by families with lower income and near areas of environmental protection.

It will be also necessary to strengthen the associations and cooperatives of waste pickers and to build more central mechanized waste sorters.

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TABLE 1: Ranking of household waste generation per region, percentage of recycled waste, and income per capita in São Paulo in 2016.

| RANKING OF HOUSEHOLD WASTE | REGIONAL OFFICE | TOTAL HOUSEHOLD WASTE in 2016 (t) | % RECYCLED | PER CAPITA INCOME (SEADE, 2010) |
|----------------------------|-------------------|-----------------------------------|------------|---------------------------------|
| 1º | SE | 182,152 | 3.51% | 1,970 |
| 2º | CAMPO LIMPO | 179,294 | 2.25% | 1,074 |
| 3º | CAPELA DO SOCORRO | 173,736 | 3.60% | 1,001 |
| 4º | MBOI MIRIM | 158,783 | 0.18% | 513 |
| 5º | BUTANTA | 157,497 | 2.28% | 2,018 |
| 6º | MOOCA | 152,384 | 2.14% | 1,442 |
| 7º | ITAQUERA | 146,374 | 0.85% | 638 |

| RANKING OF HOUSEHOLD WASTE | REGIONAL OFFICE | TOTAL HOUSEHOLD WASTE in 2016 (t) | % RECYCLED | PER CAPITA INCOME (SEADE, 2010) |
|----------------------------|-----------------------|-----------------------------------|------------|---------------------------------|
| 8° | PENHA | 145,636 | 1.07% | 861 |
| 9° | IPIRANGA | 143,680 | 3.53% | 1,309 |
| 10° | PIRITUBA / JARAGUA | 136,428 | 1.31% | 818 |
| 11° | PINHEIROS | 134,865 | 5.84% | 4,138 |
| 12° | CIDADE ADEMAR | 125,744 | 1.90% | 586 |
| 13° | FREGUESIA/BRASILANDIA | 125,601 | 0.81% | 739 |
| 14° | SAO MATEUS | 121,900 | 1.12% | 495 |
| 15° | LAPA | 121,345 | 5.91% | 2,266 |
| 16° | VILA MARIANA | 116,995 | 10.06% | 3,765 |
| 17° | MARIA / GUILHERME | 112,868 | 0.84% | 919 |
| 18° | SANTANA / TUCURUVI | 108,125 | 2.91% | 1,523 |
| 19° | CASA VERDE | 103,552 | 0.79% | 924 |
| 20° | SAO MIGUEL PAULISTA | 98,583 | 0.45% | 518 |
| 21° | SANTO AMARO | 94,236 | 5.21% | 2,678 |
| 22° | ITAIM PAULISTA | 92,125 | 0.36% | 469 |
| 23° | ARICANDUVA/FORMOSA | 90,615 | 1.25% | 1,248 |
| 24° | JACANA/TREMEMBE | 89,002 | 0.58% | 714 |
| 25° | SAOPEMBA | 81,059 | 0.88% | Not available |
| 26° | VILA PRUDENTE | 71,986 | 2.58% | 871 |
| 27° | GUAIANASES | 68,505 | 0.36% | 463 |
| 28° | JABAQUARA | 66,831 | 3.80% | 1,233 |
| 29° | ERMELINO MATARAZZO | 61,524 | 2.93% | 703 |
| 30° | PERUS | 44,617 | 0.05% | 500 |
| 31° | CIDADE TIRADENTES | 43,307 | 0.37% | 407 |
| 32° | PARELHEIROS | 36,187 | 0.01% | 375 |