Acta Scientiarum

http://www.uem.br/acta
ISSN printed: 1806-2563
ISSN on-line: 1807-8664
Doi: 10.4025/actascitechnol.v35i4.16095

Evaluation of a municipal program of selective collection in the context of the national policy of solid waste

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ABSTRACT. The selective collection of domestic solid waste occurs in a fragmented and disorganized way in most parts of Brazil, through the anonymous and precarious work of informal garbage collectors. The Brazilian law 12.305/2010 (BRASIL, 2010) meets the social need for a regulatory milestone of this waste management and makes it clear the intention to include recylable material collectors. This paper aimed to evaluate the implementation of a program of selective collection of domestic solid waste with the segregation at origin and the participation of recyclable material collectors in the assistance established by PNRS (National Policy for Solid Waste). The research strategy used was a case study of the program of selective waste collection in the city of Londrina, Paraná State, Brazil. The project included document analysis, visits to the sorting units and collection areas in order to monitor the data collection process. The adverse aspects of the program were concentrated on technological and health dimensions, and the positive aspects were concentrated on environmental, social, cultural, economic and political dimensions. This article provides important data and indicators to the authorities responsible for managing solid waste, leading to reflection on the actions to be implemented, and also instruction on investments and planning actions.

Keywords: domestic waste, collectors, sustainability dimensions, legislation.

Avaliação de um programa municipal de coleta seletiva no contexto da política nacional de resíduos sólidos

RESUMO. A coleta seletiva de resíduos sólidos domiciliares ocorre de forma difusa em grande parte do Brasil, pela ação anônima e precária de catadores. A Lei 12.305/2010 (BRASIL, 2010) atende aos anseios sociais e à necessidade de um marco regulatório para gestão desses resíduos e deixa clara a indução da inclusão dos catadores de materiais recicláveis. O objetivo deste trabalho é avaliar a implantação de um programa de coleta seletiva de resíduos sólidos domiciliares com a segregação na origem e participação de catadores de materiais recicláveis quanto ao atendimento ao estabelecido pela PNRS. A estratégia da pesquisa empregada foi estudo de caso, realizado no programa de coleta seletiva do município de Londrina/PR. Foram realizadas análises de documentos, visitas às unidades de triagem e setores de coleta para acompanhamento do processo e obtenção de dados. Os aspectos desfavoráveis do programa se concentraram nas dimensões tecnológicas e de saúde e os favoráveis nas dimensões ambiental, social, cultural, econômica e política. Este artigo fornece dados importantes e indicadores aos órgãos responsáveis pelo gerenciamento dos resíduos sólidos, induzindo-as à reflexão sobre ações a serem implementadas, além de orientar a aplicação de investimentos e o planejamento de estratégias de ação.

Palavras-chave: resíduos domiciliares, catadores, dimensões da sustentabilidade, legislação.

Introduction

The issue of urban solid waste is one of the greatest concerns of contemporary societies and a challenge to public authorities. The growing increase in this waste production comes from a pattern of unsustainable production and consumption which, along with inappropriate handling, especially during the phase involving adequate final disposal, has caused undesirable effects, and usually irreversible, from a sanitary and environmental point of view, besides representing a considerable waste of materials and energy.

According to the Federal Sanitation Department (BRASIL, 2004), from 1989 to 2000 waste production increased 49%, exceeding 100 thousand for 149 tons of waste each day and the average population growth in the period between 1991 and 2000 was 16.43%. Thus, proportionally, the waste production increase was three times higher than the population growth. From 1989 to 2000, the solid waste intended for landfill disposal exceeded 15.8%

of the 32% collected waste. However, the final disposal is still inappropriate in most Brazilian cities and the growing demand for improvement and maintenance of environmental conditions has demanded from the State Government and the private sector new activities that make progress compatible with the limitations of exploring the natural resources.

The lack of disposal sites and the increasingly expensive treatment techniques have motivated several cities to carry out an Integrated Management Policy that takes all of the following, among other measures, into consideration: the reduction at the source, reuse, recycling, composting and the final disposal in landfills.

According to Fehr et al. (2001), treatment technologies adopted in Germany, Canada, Spain and Sweden have already reflected in a growing concern with landfills reduction because all the adopted technologies aim at redirecting the waste from the landfills.

The European Community has created the 1999/31/CEE Directive with the objective of proposing measures, processes and instructions to avoid or reduce, as much as possible, the negative impact of waste disposal in landfills on the environment (COMMISSION OF THE EUROPEAN COMMUNITIES, 1999). In 2006, the Directive 2006/12/CE (COMMISSION OF THE EUROPEAN COMMUNITIES, 2006) presented instructions to assist competent authorities and the private sector in determining whether a product is waste or not, and to prohibit the disposal, unloading and uncontrolled elimination of waste, promoting prevention, recycling and transformation of waste into reusable material. The objective of these measures is the cooperation among Member States to create an integrated network.

In Brazil, however, even if the lack of space and funds for the construction of new landfills in many municipalities is contributing to encourage the public sector in their search for economically sustainable alternatives, the situation is still below the necessary and desired.

It is important to point out that the transfer of advanced technologies used by developed countries must be done with caution because socioeconomic conditions of developing countries are different. It is necessary to seek alternative forms of management that meet the various needs of the population and the adoption of instruments for the inclusion of people who have been excluded from the process so far, according to Leite et al. (2003). The solution to the waste problem may involve a complex interdisciplinary relationship, covering political and geographical aspects, local and regional planning, sociology and demography elements, among others.

In Brazil, managing urban solid waste is responsibility of the city council, according to article 30, paragraph V of the Federal Constitution of 1988 (BRASIL, 1988). Therefore, the city has to provide waste collection, transportation, treatment and final disposal os this waste in an environmental correct way. The National Law of Public Consortium - Law 11.107/2005 (BRASIL, 2005) and the National Law of Basic Sanitation - Law 11.445/2007 (BRASIL, 2007) inform a new legal system that induces associative formats and different institutional designs. Among these, aiming at implementing landfills and Projects of Clean Development Mechanism (CDM), the common concession or the adoption of a public-private partnership (PPP) are included.

As it is known, the solid waste in Brazil has required State maintenance for a long time, especially by means of adequate and specific regulations.

The law 12.305/2010 from August 2nd, 2010 (BRASIL, 2010) came to meet social expectations and the need for a regulatory milestone for solid waste management in the current scenario, with the premise of sustainable development. It regulates "[…] principles, objectives and instruments, as well as the guidelines related to integrated management of solid and hazardous waste, to the responsibilities of the waste generators and the government and to the relevant economic instruments."

It also presents tools to carry out the environmental policy, such as the inventory and the annual report system of solid waste; the selective waste collection, the reverse logistics systems and other tools related to the implementation of shared responsibility for the products life cycle, the incentive for the creation and development of cooperatives or other forms of associations of informal collectors of reusable and recyclable materials among others.

Besides being the direction to improve the urban solid waste handling, the system of integrated management can also optimize the trading feasibility of reduction of pollutant substances, leading to the Clean Development Mechanism (CDM).

This path consolidates an opportunity for environmental, social and economic sustainability of management systems of cities' solid waste. However, for the implementation of the CDM it is necessary to restore landfills to receive the necessary technology for gas extraction; to minimize environmental impacts by treating the percolated

liquid, also known as leachate, and to design, license, establish, oeperate and monitor landfills.

Importantly, in order to reduce the impacts of solid waste disposal in landfills, even if sanitary, it is relevant to implement selective waste collection with segregation at origin and composting of organic matter. Therefore, it is essential to also separate the organic material at origin.

Although in recent years the rate of commitment to Selective Collection Programs has been increasing in Brazil and there is a constant talk about recycling materials, very little has been done or even discussed, in relation to the organic matter present in solid waste collected in the country. In a way, such fact sounds somehow curious; observing that on average 55 to 60% in weight of waste produced in the country is made up of organic matter.

According to data from the Diagnostic management of waste solid -2010 (BRASIL, 2012), the selective collection is practiced in 2051 municipalities, or 37% of all municipalities in the country, but there are no data on its scope. Also according to data from Diagnosis (BRASIL, 2012), in the South and Southeast of the country, about 50% of counties reported receiving the selective collection service, while in other regions, this number even reaches 20%. This diagnosis also evidenced that the service had an almost linear relationship with increasing population size, as varied from 30.8% in the counties Band 1 (up to 30 thousand) to 86.9% in the range 4 (of 250,001 to 1,000,000 inhabitants), reaching 100% in the last track (Rio de Janeiro and São Paulo States). It should be emphasized once more that do not provide data on the extent of selective collection service in the municipalities participating in the diagnosis.

Due to the serious financial difficulties that small municipalities (that is, less than 20,000 inhabitants) in Brazil have been experiencing, they can not ignore the opportunities to generate resources and comply with environmental regulations.

Among the real existing opportunities, recycling and composting solid waste is beginning to be seen as a feasible solution. However, one of the major obstacles for the implementation of composting, mainly in those municipalities, is the alleged need for high investments for the implementation of a sorting center, due to the lack or ineffectiveness of the selective collection program.

In this sense, the Law 12.305/2010 (BRASIL, 2010) encourages the acknowledgement of recyclable solid waste, and this will bring new markets, jobs, work and income, and will lead to the social inclusion of informal recyclable collectors.

The feasibility of several objectives proposed by PNRS are directly related to the effective use of these instruments which depend on the participation of various actors of the economic chain of products, which starts with the choice of raw material, on the manufacturing process aiming at reducing waste production and its reuse and recycling and /or the final disposal with reduced environmental impact.

For over five years, some cities have implemented selective collection of recyclable materials with different operating methods. Therefore, it is important to evaluate these programs according to the rules established by the PNRs, which is proposed in this paper, choosing a program like scenario of a municipality with approximately 500,000 inhabitants.

Objective

To evaluate the planning and strategies of a program of selective collection of recyclable materials with segregation at origin and the inclusion of informal waste collectors as established by the National Policy for Solid Waste.

Material and methods

Study area

The program of urban solid waste selective collection of the city of Londrina/Paraná State, located in northern Paraná, southern Brazil, and population of approximately 500,000 inhabitants, with only 3% in rural area, was chosen to conduct a case study. The city has a selective collection program with the participation of recyclable material collectors established since 2001.

According to data provided by the Planning Department the city of Londrina, the estimated population in 2009 was 510,707 inhabitants, among which 96.93% live in urban areas and only 3.07% in rural areas.

Data collection and analysis

In order to consider a selective collection program, data was collected through document analysis and technical visits to the Municipal Transit and Urban Development Company - CMTU - which is the agency responsible for managing urban sanitation in the city, to the Research and Urban Planning Institute - IPPUL, and to the Municipal Environment Administration. Visits for direct observation were also made to units of waste sorting and collection areas.

Information was gathered on the general structure of the management system of municipal

solid waste and on specific data of the selective collection program such as: management system, workflow, coverage, number of participating associations, evolution of the amount of collected recyclable material and population participation.

Results and discussion

Type of institutional organizational arragement

As previously mentioned, the Municipal Transit and Urban Development Company of Londrina - CMTU is the agency responsible for public sanitation.

The funding for operating the public sanitation management is budgetary, part coming from public sanitation tax collection on IPTU (municipal real estate tax), through a specific item and comes from the Urban Development Fund of Londrina - FUL – managed by CMTU.

Action planning and strategies to implement the program

Program implementation process

The selective collection in Londrina began in 1996, running until May 2001 through the door-to-door system with human resources of the work front and a city truck. According to information from the CMTU selective collection coordinator, to that date the collection was available to 30,000 households in the downtown area and collected up to 4 tons/day, which represented approximately 1% of domestic solid waste generated. The material was sent to a sorting unit of 300,00 m^2 operated by 22 employees at the work front, located in San Miguel country house, southern Londrina, and the material was traded by the public sector.

In June 2001, CMTU promoted the removal of informal waste collectors from landfills, encouraging them to form associations, inserting them in selective collection because an individual work system was operationally very fragile to support the program and by dividing the city into units, organized by associations, there would be an organized process of data collection with the inclusion of informal collectors.

At the time, other independent collectors have registered at the municipal office also in search of recyclable materials, and were also advised to form associations to participate in the selective collection program.

Collectors were sent to a single city-owned sorting unit whose objective was the qualification to know the different types of recyclable materials found in household waste and market position. Still in 2001, during four months CMTU has continued the door-to-door collection, using two trucks that carried the collected material to this sorting unit. This period was important for training the collectors and forming the first associations. There was a real commitment of the city to explain to the collectors the role of each one in the association, the importance of collective work, and the vital importance of the participation of population in the collection process.

With the guidance of CMTU, the board of each association was composed of a chairman, a treasurer and a secretary, as well as a finance committee, with three people.

That same year of 2001, CMTU has delimited the area surrounding the city central region, divided it into 10 units and gave each association one of the units. The central region maintained the door-to-door system with the city vehicles. The criterion for the unit distribution was the proximity to the collectors' houses. However, there were exceptions since some collectors already had their collection areas and asked to remain in those neighborhoods. Another unit distribution factor was the amount of personal in each association. CMTU made official the new program of selective collection by introducing the collectors to each household by eight city servants. In this approach, servants escorted the collectors and together informed the population about the environmental benefits of selective waste collection and the possibility of generating income for the personnel involved. This work lasted about 60 days.

The collectors began to work with carts provided by the city, maintaining direct contact with the population. On the second half of 2001 there was an expansion of the selective collection coverage to 50,000 homes. Although the selective waste collection service with the inclusion of collectors in the city had not been regulated, they were responsible for promoting instructions on how to sort waste and the collection frequency through direct approach to residents by delivering information flyers.

The collected material was taken to strategic points by the collectors, and selected in conjunction with the public sector, which were then called 'flags'. This term was borrowed from corn crops where, in the manual process, the harvester catches the ears of corn and places them in baskets, organizing them into small mounds called 'limits' or 'flags'.

The city was responsible for the transportation, and for the 'flags' in each unit until the sorting process in each association.

The process gradually progressed and, at the end of 2001, there were 13 associations, with a total of

126 people. The following year, there were other 10 associations with a total of 298 people. In 2003, other 2 associations with 42 people and at the end of 2004, there was another association with 8 people. Finally, in 2005, there were other 3 associations with 30 independent collectors for the central region.

According to information from CMTU's selective collection coordination, the associations were instructed to notarize their bylaws. In 2005, all associations had made record in office, five of which had been declared as work for public use.

One of the main problems was to trade the recyclable materials which were negotiated separately by each association, which reduced the retail value. In 2002, with the purpose of increasing the retail price of recyclable materials, members of 20 associations formed a new association called 'Cepeve' (Pressing and Sales Center), which was responsible for joint trading of materials.

By 2005, the city unit distribution was determined by CMTU, which considered the operational support of each association and efficiency shown in the last three months, in order to enlarge, reduce or restructure the units.

Inadequate sanitary conditions of storage of materials to be sorted and lack of sanitary facilities were found in the screening units' inspection.

The CMTU has technical and administrative staff for the program coordination and maintains control over its development, from the territorial organization to the social demands coming from the associations.

In 2005, the CMTU staff, allocated in the selective collection coordination department, was composed of a coordinator, a supervisor, two collection inspectors, two technical-administrative workers and two interns, and used a utility vehicle to develop the following activities: Lectures in schools and condos; Meetings with collectors to form associations: Training courses for collectors about sorting recyclable materials; Mediation of conflicts among collectors; Preparation of projects to obtain funds; Interaction with other city departments to integrate the collectors to other city programs; Interaction with educational institutions to form partnerships to obtain courses such as: youth and adult literacy, adult education to complete primary and secondary education, and administrative management; Assisting the population with information and complaints.

Organizational structure of the program

Table 1 shows organizational data of the selective collection program regarding the number of formed associations, number of collectors included in the program, collection coverage, population participation, and number of inhabitants assisted by each collector between 2001 and 2005.

Table 1. Indicators of the selective collection program in relation to their organizational structure in the period of 2001 to 2005.

Year	Number of associations	Number of collectors	Number of inhabitants per collector	Collection Coverage (%)	Population participation (%)
2001	13	126	1260	36	30
2002	23	424	506	48	40
2003	25	466	778	80	50
2004	26	474	885	90	65
2005	29	504	939	100	70

From 2001 to 2002, the number of associations increased 77% and the number of collectors was larger than three times. In the period 2002 to 2005 the growth in number of associations was 26%, and the number of collectors of 19% (Table 2). According to information obtained with the CMTU selective collection coordination, in the last three months of the year the number of collectors increased about 20% due to the increase of recyclable materials available, especially cardboard, plastic soda bottles and aluminum cans.

Table 2 shows that the average number of collectors in the selective waste collection program in past four years was 467. Thus, considering the average number of associations in this period (26), it is observed that the average of collectors per association was 18 members.

The number of inhabitants served by each collector was over 1,260 in 2001, with a coverage rate of 36% to 939 in 2005, with a coverage rate of 100%, there was a reduction in the number of people served by collectors, although the number of collectors increased during that period. This fact is justified mainly by the increase of 64% in the coverage rate.

The indicator referring to residents served by collector listed in Table 2 favorably meets the principle of sustainability 'Ensuring proper working conditions', proposed by Milanez and Teixeira (2003), because it includes in the program the landfill waste collectors who worked in risk situation and collectors working precariously on the streets.

The Cepeve president commented that collectors' turnover is higher in some associations due to relationship problems among collectors and the president and treasurer of each association, and to the attitude at the time of payment settlements, since there is sometimes inadequate distribution of profit from the sale of materials.

Cepeve, in partnership with the CMTU, conducts a follow-up service with associations in

order to prevent these problems. However, currently only 20 of the 29 associations participate in Cepeve because others trade the material separately, and the employer-employee relationship is more difficult to be monitored.

According to the CMTU selective collection coordinator, the absenteeism rate is close to 5% and is directly related to the by-laws of each association, the stricter the by-laws the lower the rates. However, it should be noted that not all collectors know or follow the by-laws rules.

During visits to the sorting units, we observed that around 80% of collectors are women, which was justified by the president of Cepeve as the lack of work opportunities for women. The associations collect recyclable materials daily. However, each organization has their schedule, although most do collection in the morning. Nowadays, twenty-three associations work from Monday to Friday from 8:00 to 5:00 and six associations work even on Saturdays.

The evolution in the collection coverage shown in Table 2 was gradual and reached 100% of households in 2005 with a participation rate of 70%, much higher than in 2001 when 36% of households were covered by the selective collection and, among them only 30% joined the program. Through the collection follow-up, a strong participation of the population was observed, creating a solidarity bond given the direct relationship with the collector.

The indicator regarding the coverage rate of selective collection favorably reaches the objective of 'Universalisation of Services' established by the PNRS, but only partially because although the service is available to 100% of the population, the frequency needs to be increased.

Table 3 shows the rate of material gathered by the selective collection in relation to conventional UW (urban waste) collection, number of people served per vehicle used by the public sector, coverage rate, per capita recyclable material mass collected and per capita production of UW.

Table 2 shows an increase in the rate of material collected through the selective collection program. The index ranged from 2.92% in 2001 to 24.17% in 2005, representing an increase of 21.25%. This growth rate was caused by the expansion of the selective collection program and evidences the amount of recyclable waste that was no longer collected by the company responsible for conventional collection.

Gradually, the organization of selective collection work, with the transition from individual form or trading to the collective form and the progressive specialization of integrated functions, has increased the associations' income among all participants since it was possible to negotiate better prices for recyclable materials, due to economy of scale and bargaining power, mainly because recyclable materials trading is vulnerable to international market conditions.

Table 2. Indicators referring to the rate of material gathered by the selective collection.

Indicators	2001	2002	2003	2004	2005
Rate of material gathered by the selective collection program in relation to the quantity of UW gathered by the private agent (%).	2.92	5.12	10.88	18.42	24.17

The program also serves the principle of recognition that reusable and recyclable solid waste as economic goods and has a social value that creates jobs and income and promotes civic awareness, because the city program guides and supports the inclusion of these workers in the process, reaching a significant number of people.

The CMTU offers a contact phone number for the population, which is printed in information flyers delivered by the collectors, that acts as a link, but the call is paid. According to information from the CMTU selective collection coordinator, in 2005 they received about 60 complaints a month, which means 18×10^{-5} monthly complaints to each participant of the program, mostly related to the frequency of selective collection in their neighborhoods, indicating a demand to increase it because in most units the collection occurred only once a week. When the complaint is directed to a whole unit for lack of collection, another association is contacted by CMTU to perform it. But when the complaint for lack of collection refers to a household, CMTU provided the service. These measures are important so that the credibility of the program is not undermined.

During the period 2001 to 2005 there was no expense as a result of advertising campaigns and educational, for the CMTU had the understanding that make a disclosure with no operational support to absorb the increased availability of recyclable materials, due to a wide disclosure could undermine the credibility of the program. During this period, information about the program was provided through the direct approach of the collector to the population.

The downtown area was the last sector to be included in the program with the systematic collection of waste collectors because until February

2005 the collection was door-to-door with using public sector trucks.

Currently material collected in the downtown region were taken by collectors from two associations and sent to a transfer area that belongs to the city. These associations were formed by independent collectors who were already working in the downtown region and collected mainly from businesses. The housing compounds have shown a lower participation in the program, a fact that is justified by the selective collection coordinator, because of the difficulty of direct contact between the residents and collectors, which emphasizes the importance of developing a solidarity bond. Therefore, it is observed that different service must be offered at the compounds.

In addition to the participation of households and businesses, the same also occurred in several other sectors such as hospitals, health care centers, medical and dental clinics, banks and government agencies. The organization of the city into units has promoted a more effective monitoring of the selective collection service and resulted in a greater credibility in the program. Another important factor was the professionalization, aiming not only at training the collectors, but mainly the pursuit of social integration and financial independence.

The interaction among public sector agencies was also observed, which is very important. To mention an example, the City Health Department now requires that, at the moment of approval of the plans for health service waste management, businesses participate in the selective collection. This control is established through a statement, as the model in Appendix E, indicating the availability for collection of recyclable materials.

Favorable and unfavorable points in adopting PNRS

Considering that PNRS defines the integrated management of Solid Waste as a set of actions aimed at finding solutions to solid waste, in order to consider the technological, political, economic, environmental, cultural, public and social health dimensions, with social control and under the premise of sustainable development, the described program will be evaluated according to these dimensions.

Technological Dimension: The aspects of the program being evaluated are unfavorable due to insufficient equipment that reduces the collector's effort and the lack of vehicles in better maintenance conditions at the stage of transporting recyclable material to the flags.

Political Dimension: It presents favorable aspects because of the participation of the public sector, which enabled the expansion of the coverage rate from 36% in 2001 to 100% in 2005, and because of the organization into units, which provided a more effective monitoring of the selective collection services by public sector, raising the level of responsibility of the associations. In addition, the City Advisory encouraged the formation of associations contributing to the reduction of conflicts among collectors and to create jobs and income. An unfavorable aspect is the inexistence of a legal framework concerning the selective collection rules and regulations.

Economic Dimension: It presents favorable aspects in relation to:

a) decentralization of the sorting units and the system of accumulation points of 'flag' materials, which contributed to reducing distances traveled by the transportation provided by the public sector and consequently the cost of selective collection;

b) joint trading of material with the main purpose of increasing the sales price;

c) the organizational form of the program that was designed to provide financial independence for collectors, non-assistance-related, which can be observed in 2005 when out of 29 associations 17 were no longer depending on financial resources available to rent sorting units.

Environmental Dimension: The favorable aspects are:

a) sending waste to the municipal landfill which increased from 2.92 in 2001 to 24.17 in 2005;

b) participation of the population that takes the lead in sorting at origin;

c) adoption of the door-to-door method of selective collection with collectors, made it possible to measure the participation of the population;

d) sharing information about the program and the environmental education took place through daily contact of the collector with the population, ensuring the disposal of recyclable material, increasing the credibility on the program, which was confirmed by the index of the participation rate of the population ranging from 30% in 2001 to 70% in 2005;

e) the population acquires hygienic habits, not littering in public places and contribute to the city cleaning and to public health;

f) the number of inhabitants served by each collector raised from 1260 in 2001 with a coverage rate of 36% to 939 in 2005, with a coverage rate of 100%, mainly due to the increase of 64% in the coverage rate;

Cultural Dimension: it presents favorable aspects due to:

a) the inclusion of recyclable material collectors, which increased from 126 in 2001 to 504 in 2005 and the working conditions in the sorting units, which varied proportionally to the organization degree of the associations, according to their characteristics, because they were free to choose their mates. This is one of the essential factors to be respected because it is fundamental to respect the differences observed among associations and it is necessary to understand that the group matures over time, according to their specific characteristics.

b) the recovery of self-esteem because now literacy, management, crafts and psychological courses are required, due to relationship problems;

c) professionalization, aiming not only at training the collectors, but mainly at the pursuit of social integration and financial independence.

Social Dimension: It presents favorable aspects due to:

a) equal distribution of selective collection services when it reached the coverage rate of 100% in 2005;

b) program method that made the inclusion of collectors possible, reaching an average of 400 in 2005;

c) the inclusion of independent collectors in the program, which prevented competition among groups and allowed proper control by the government;

d) availability of a mechanism for measuring the population satisfaction with the program.

e) direct contact between the collector and the population caused a permanent change in values and attitudes and recovered the spirit of participation and solidarity;

f) the collective method of working on selective collection has contributed to reduce violence in the streets and in collectors' homes;

g) a demonstration of self-esteem recovery and pride for the work they do and social get-togethers at the end of each year with the presence of members of associations and families;

h) several social benefits were observed, mainly concerning the condition of civic awareness because early in the process many did not even had their personal documents, had serious difficulty to relate and to communicate with the population. With the implementation of the program, this situation was completely changed;

i) the population becomes solidary, helping to overcome barriers of prejudice and inclusion of collectors and avoiding social assistance spending.

Public Health Dimension: The aspects are unfavorable due to the inadequate sanitation conditions at the sorting units (insufficient sanitary and lunchroom facilities, and cleaning products storage)

Conclusion

The selective collection program concentrates unfavorable aspects regarding technological and public health dimensions, and favorable aspects considering environmental, social, cultural, economic and political dimensions.

The systemic analysis of the integrated management through the sustainability dimensions provides a global view with the evaluation of each dimension. It is important to create evaluation tools and, mainly, indicators for each dimension because this is the only way possible to determine whether the selective collection is an important instrument of national policy and also because the indicators are essential to any management system.

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Received on February 19, 2012.
Accepted on January 29, 2013.