

INFLUENCE OF WASTE PICKER ORGANIZATIONS AND SELECTIVE WASTE COLLECTION ON SUSTAINABILITY INDICATORS

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Abstract: In order to meet the requirements of the Brazilian National Policy on Solid Waste, in addition to the need to know the factors that interfere in the development of selective waste collection and the waste picker organizations, it becomes important to understand the correlation between these factors, both with each other and with the environment in which are inserted. In this sense, this paper evaluate the selective waste collection programs and municipal waste picker organizations in the state of Espírito Santo, Brazil, in relation to sustainability indicators and their correlations. To that end, 24 municipalities were selected, evaluated by their selective waste collection programs, and 23 waste picker organizations, on which questionnaires were applied to obtain the necessary data for the calculation of the indicators of sustainability. Statistical analyzes were used to identify the correlation between the Indicators of Sustainability and correlation analyzes were applied to study the normality distribution.

Key words: Indicators of Sustainability, Selective Waste Collection, Waste Picker Organizations.

1. Introduction

In Brazil, with the approval of the National Policy on Solid Waste (NPSW), instituted by Federal Law No. 12,305 of 2010, the municipalities are obliged to implement and improve the selective waste collection (SWC) with integration of waste picker organizations (WPO) into the Integrated Solid Waste Management (ISWM) municipal systems [1], but the inclusion of recyclable waste pickers in the selective waste collection is not, in fact, integrated with the ISWM. Thus, while in theory legislation supports waste picker organizations and promotes reuse and recycling as a sustainable solution for waste, in practice many challenges still need to be overcome [2]. Municipalities, in general, face technical and administrative difficulties to perform selective waste collection in a universal and efficient way, as well as to relate to RMPOs as service providers [3].

In this sense, Dias [4] emphasizes that, with the lack of consistent information about the performance of selective waste collection with waste pickers, waste management is compromised, limiting the possibilities of social inclusion. Therefore, the use of sustainability indicators as a tool for planning, monitoring and evaluation contributes to the performance of selective waste collection and WPO programs towards sustainability.

Additionally, knowledge about the factors that interfere in the development of the selective waste collection and the waste picker organizations, it becomes important to understand the correlation between these factors, both among themselves and with the environment in which they are inserted. This knowledge can aid in the decision-making processes for the application of public policies aiming at the improvement of services related to waste.

2. Material and Methods

This research analyzed 24 municipal selective waste collection programs and 23 WPO using sustainability indicators in order to understand the performance of municipal SWC programs and WPO in relation to sustainability. For this, 10 Indicators of Sustainability of the Selective Collection (ISSC) and 16 Indicators of Sustainability of the Organizations of Collectors (ISOC) were analyzed using descriptive statistics. For that, means and frequencies were calculated to analyze the value of each of the indicators in relation to sustainability.

In order to identify the correlation between different aspects pertinent to the development of the SWC and the WPO, statistical analyzes of the peer-to-peer correlation between the data (Sustainability Indicators, time of existence of the WPO and size of the municipalities) were carried out together with the construction of graphs obtaining correlation coefficients. For the application of the correlation analyzes, the normality of the quantitative data was previously verified through the Shapiro-Wilk statistical test. For the samples that presented a Normal distribution, the Pearson correlation was used and for the Sustainability Indicators that did not present a normal distribution, the Spearman correlation was used. Statistical tests were performed at a significance level of 5% with the aid of the free software PAST.

3. Results and discussion

ISSC analysis: among the 24 selective waste collection programs surveyed, it was observed that 58% of the municipalities presented "very favorable" results regarding sustainability for the indicator "legal instruments in the relation of the city with service providers of selective waste collection". This result can be explained by the fact that the contract for the provision of the service is an indispensable item since it offers security to the city hall as contractor of the services. The other ISSCs did not obtain "very favorable" results in relation to sustainability.

ISOC analysis: among the 23 RMPOs studied, "favorable results" were observed in terms of sustainability for the indicators "regularization of the organization" (83%), "self-management" (74%), "training of the organization" (57%) and "tailings rate" (52%). For these four Indicators of Sustainability, the satisfactory results observed are due to the fact that the State government offered to the WPO of the ES, through Aderes, when they were in the structuring phase, besides the support that the local governments also grant to the RMPO. Still, "very favorable" results were observed in 78% of WPO in relation to the "gender ratio" indicator and in 48% of WPO in relation to "turnover". The satisfactory results for these two indicators are related to the organizational issues that are developed in the work practice and through training. The other ISOCs, however, did not obtain "very favorable" results in relation to sustainability.

Correlation analyzes: the results of moderate direct correlation and information from the literature showed that the average income of the members of the organizations (Socioeconomic aspect) and that the working conditions, health and safety tend to influence the rotation (Organizational aspect). The literature also indicated other influencing factors, such as sex and age of the associates. It was highlighted that, despite these factors, a great determinant for the permanence of the pickers in the organizations is the difficulty of finding another better job. Direct moderate correlation of indicators of diversification and quality of WPO partnerships (Institutional aspect) with the environmental conditions of work within the sorting centers were observed, and moderate direct relations of the training indicators of the WPO (Organizational aspect) with the conditions of work in the collection of dry waste and with health and safety conditions. Infrastructure deficiency was highlighted as a limiting factor for improving working conditions. It was highlighted the relevance of external support in the expansion of the niches of activities of the organizations when verifying correlations between the quality indicator of the partnerships, which represents the contribution made possible by the partners, and the indicator of diversification of activities and services performed (Organizational aspect). The correlations among the legal aspects of organizations have indicated that the more regularized the organization, the greater the fulfillment of the requirements for its hiring. In the evaluation of the influence of the aspects that influence the average income of the associated collectors and the efficiency of the selective waste collection and of the WPO, the expected correlations were not statistically verified. For productivity, there were no correlations with training and self-management data.

4. Conclusions

Despite the efforts made to implement selective waste collection programs and to structure WPO after the establishment of NPSW, municipalities still face several difficulties regarding the integrated management of solid waste. The present research showed that the municipalities of the Espírito Santo, Brazil, need to improve the management of solid waste, especially with regard to selective waste collection and recycling. The results indicated the intercorrelation between socioeconomic, organizational, legal, institutional and working conditions, health and safety, through the verification of moderate correlations, indicating, however, the existence of external influencing factors. For some analyzes, the existence of correlation was not statistically verified, although the literature presents a contrary idea. Despite the internal correlations between the aspects, the study highlighted crucial factors in the evolution of the selective waste collection systems integrated to the WPO: existence of a market for recyclables, system coverage and access to marketable waste

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