ANALYSIS OF THE COMMUNICATION PROCESS OF SELECTIVE WASTE COLLECTION

ANÁLISE DO PROCESSO DE COMUNICAÇÃO DA COLETA SELETIVA DE RESÍDUOS
ANÁLISIS DEL PROCESO DE COMUNICACIÓN DE LA RECOGIDA SELECTIVA DE RESIDUOS

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ABSTRACT:
Considering the increase in the generation of solid waste worldwide, selective waste collection is one of the initiatives that promote the reverse logistics of these materials, in a way to reduce environmental impacts. However, mobilizing the population to promote the return of these wastes has been a difficult task among public managers. Only strategically implemented communication, not treated in a unique way to reach all audiences, can contribute to the success of selective collection programs. Therefore, this study aims to identify significant variables, from the individuals' opinion, that impede understanding the message content provided in selective collection programs. For this, a case study was carried out in a city located in the state of São Paulo, Brazil. Multiple logistic regression was used as a statistical analysis tool, in which the response variable (the individual's capacity to understand the content of the messages) is considered as a function of 33 explanatory variables. From the data analysis, it was obtained the most adequate logistic model with a predictive capacity of almost 92%, such that six explanatory variables (Genre; If the citizen performs separation of materials; If the citizen knows how selective collection helps the environment; If the citizen knows the municipal cooperative; If the citizen knows that the separation contributes to the economy of the city; and, Citizen preference for other media for feedback) were significant to the response variable. The results showed there is an interference of variables in the individual's capacity to understand the content of the messages, indicating that in a communicational process it is necessary to take into account the peculiarities and heterogeneity of the population to achieve the intended purpose.

KEYWORDS: Communication; Social Mobilization; Selective Collection; Municipal Solid Waste; Logistic Regression.

1. Introduction

Despite major global developments, the issue of solid waste remains unresolved, especially in underdeveloped countries where the systems used are still far from adequate, both from final disposal and the reuse of waste.

It should be noted that this last aspect is even more complex to be solved since this depends on the population's awareness both for the reuse of waste, as well as for recycling practices and also for the reverse logistics activity. These practices are related to "circular economy" principles, which provide for the maintenance of products, components and materials at the highest level of utility and value, in order to promote circular flows to reduce environmental impacts and maximize resource efficiency (Macarthur, 2013; Moreau *et al.*, 2017; Saavedra *et al.*, 2017).

Municipal waste management, which includes solid waste, plays an important role in sustainable development. The 2030 Agenda of the United Nations includes 17 Sustainable Development Goals (SDGs) and 169 targets, one of which, SDG 11, aims to make cities and human settlements inclusive, safe, resilient and sustainable. Goal 11.6 is to reduce the per capita negative environmental impact of cities, including paying special attention to air quality, municipal waste management and others (UN, 2015).

In this way, the selective collection of municipal solid waste (MSW) is one of the initiatives that promote the reverse logistics of the materials so that they can be reused and recycled in the same or another production process. However, the course of raising awareness and modifying individuals' attitudes toward selective collection does not occur quickly. First, one must understand if the individual can internalize a message. The message is the capacity of information to enter the cognitive of an individual, to undergo a process of codification/decoding in which the knowledge is deconstructed (situations already consolidated) and the information is gathered by the medium, transforming into absorbed knowledge that, later, will become beliefs (Moscovici, 2009). According to the same author, only when knowledge is converted into beliefs, the transformation of individuals occurs.

In addition to this ability of the individual to internalize the information, it is necessary to consider the aspects that influence the behavior of selective collection, as it becomes easier, cheaper and more effective to promote communication campaigns aimed at transforming posture and modifying the population habits.

For example, in a California survey conducted by Saphores *et al.* (2006), which investigated the key factors that influenced the willingness of families to leave e-waste in recycling centers, the author found that genre, education, convenience, and environmental beliefs were significant to this end. In another study, Grodzi'nska-Jurczak,

Tarabula and Read (2003) pointed out that the motivation of the inhabitants to collaborate with selective collection can also occur according to age and social pressures.

However, in addition to the intrinsic characteristics of each citizen and the surrounding culture, one should also consider the daily life of the population to establish communication campaigns for the segregation of MSW. In some studies, the main reasons raised by citizens not to participate in the selective collection are the inconvenience of separation, lack of time, too much effort involved, lack of space for storage, problems with handling and lack of sufficient materials for segregation (Miller Associates, 1999; Perrin; Barton, 2001).

For effective public policy, one must take into account the various factors that influence the correct disposal of waste by citizens. There is a diversity in behaviors and practices according to the heterogeneity of people and the variety of factors (Lim-Wavde, Kauffman; Dawson, 2017). In addition, it is essential to invest in previous research so that the communication strategies take into account the local context, from the analysis of the population routine and political, cultural and demographic factors of each region, to reach a greater number of possible individuals engaged with the correct segregation of MSW (Timlett; Williams, 2008).

Only strategically implemented communication can contribute to the success of public policies, and by extension, for selective collection programs (SCP). It is essential to use it as an indispensable way for the success of those policies and not only as an accessory since it is the main responsible for impacting the attitudes, opinions, and beliefs of a citizen (Bakhov, 2013; Romanenko, 2016).

Then, understanding the personal motivation of the actors involved, the lifestyles they lead, the pro-environmental behavior and the situational constraints for a better communication process, is fundamental (Tucker, 2001; Shaw; Van Vugt, 2004). Only by particularizing municipal communication strategies and not massing them, is that it will be possible to reach all individuals for a change of position (Cezar, 2018).

The most recent works in the literature about SCP deals with new technologies for waste management and mentions only that communication is indispensable for their management. However, these works do not refer to the communication process of MSW nor do they consider quantitative approaches.

Then, this paper aims to identify significant variables, from the citizens' opinion, that can impede understanding the message content provided in SCP, and to contribute to the outcome of the implementation and effectiveness of communication public policies. For this, a city located in the western region of São Paulo state, Brazil, was

considered as a case study, and a survey was carried out with citizens of this city during the year 2019.

This paper is organized as follows. The methods of this proposal are described in detail in Section 2. Section 3 presents results and discussion based on a case study carried out in Brazil, and Section 4 concludes the paper.

2. Material and methods

This present research has an applied nature, is descriptive about the objectives, and uses a quantitative approach.

The object of this study is citizens of a city located approximately 600 km from the capital of São Paulo state. According to the Brazilian Institute of Geography and Statistics (IBGE) (IBGE, 2021), this city has a population estimated at 65.615 inhabitants.

To obtain representative primary data of the household population, the technique of stratified probabilistic sampling (by region in this city) was considered. To calculate the sample size, it was considered the individual's ability to understand the content of the messages as the most important (qualitative) variable and a finite population of households, using the following equation (Martins, 2017):

$$n = \frac{\sum_{i=1}^{k} \left(\frac{N_i^2 p_i \ (1 - \ p_i)}{w_i} \right)}{N^2 D + \ \sum_{i=1}^{k} N_i \ p_i \ (1 - \ p_i)} \tag{1}$$

where k: number of strata or regions; p_i: true proportion estimate of stratum i; N_i: number of elements of stratum i; N: number of population individuals ($N = N_1 + N_2 + ... + N_k$); $D = \frac{d^2}{z^2}$; d: estimative error, expressed in decimals; and z: abscissa of the standard normal distribution.

For this research, eight strata or regions (k = 8), an estimative error of 10% (d = 0.10) and a confidence level of 95% (z = 1.96) were considered. In addition, $p_i = 0.5$, due to the absence of previous information. The total number of households in the city (N) and the proportion of households in each region or stratum (N_i) were obtained from the online platform of the IBGE (IBGE, 2021).

According to the representativeness of each region in this city, a total sample size of 96 households by Equation (1) was defined. Then, the sample size of households in each region or stratum is given by: Region 1 = 9 (10.0%); Region 2 = 14 (14.5%); Region 3 = 41 (42.5%); Region 4 = 14 (14.5%); Region 5 = 15 (15.5%); Region 6 = 1 (1.0%); Region 7 = 1 (1.0%) and Region 8 = 1 (1.0%).

Firstly, random blocks of each region were selected using the *Bioestat software*. So, all the households of the selected blocks were surveyed until the total sample size of

households was completed. The collection of data from the citizens was carried out using a form containing predefined questions and took place on Saturdays, in the morning (08:00 a.m. to 12:00 p.m.). The name and any other information about the citizens identifying them were omitted.

Then, an optimized logistic regression model was adjusted to identify the factors that can influence the citizen's ability to understand the content of the SCP messages.

The use of logistic regression models aims to adjust the most parsimonious model to the data that is able to describe the relationship between the dependent variable Y (response variable) and a set of independent variables k (explanatory variables). The dependent variable Y is dichotomous or binary, that is, it is expressed by two categories (it assumes a value of 0 (zero) or 1 (one), representing the absence or presence of a certain characteristic, respectively) and the independent variables may or may not be numerical. Thus, the logistic model is given by the following equation:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \epsilon \qquad (2)$$

where ϵ are random variables (unknown errors). The conditional average for binaries data is given by $E(Y|X = x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k = \pi(x)$ and to vouch that Y is a probability, a logit link function is considered, which satisfies

$$ln\left\{\frac{\pi(x)}{1 - \pi(x)}\right\} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k \qquad (3)$$

Equation (3) in terms of the linear predictor is given by $E(Y|X = x) = \pi(x) = \frac{e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\cdots+\beta_k x_k}}{1+e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\cdots+\beta_k x_k}}$, that is, it is a logit mean response. If $x = x_j$ such a $chance_{(j)} = \left\{\frac{\pi(x_j)}{1-\pi(x_j)}\right\}$ and if $x = x_{j+1}$ such a $chance_{(j+1)} = \left\{\frac{\pi(x_{j+1})}{1-\pi(x_{j+1})}\right\}$, then the ratio between the chance of an event occurring in a group ($chance_{(j+1)}$) and the chance of this event occurring in another group ($chance_{(j)}$) is called odds ratio (OR) and is given by (Montgomery et $al.$, 2001):

$$OR_{(j)} = \frac{chance_{(j+1)}}{chance_{(j)}} = e^{\beta_j}, j = 1,2,\dots,k \qquad (4)$$

Hypothesis tests on the existence of parameters $\beta_0, \beta_1, \beta_2, \dots, \beta_k$ must be done to get the significant independent variables in a model. If the probability of significance (p-value) obtained by data is less than or equal to the level of significance α established in the test, the null hypothesis ($\beta_j = 0$), j = 0,1,2,..., k is rejected, and the explanatory variable X_j associated with β_j influences the response variable Y.

The most used methods for the fit validation of a logistic model are Pearson, Deviance, and Hosmer-Lemeshow, which are based on the chi-square distribution. If p-

value for these tests is less than or equal to the established significance level α, there is evidence that the model is adequate for the data (Hosmer *et al.*, 2013).

The fit quality of a logistic model can still be assessed using some jointed correlation indexes such as Somers D, Goodman-Kruskal Gamma, and Kendall Tau-a indexes. These indexes range from 0 to 1, and the larger they are, the better the predictive ability of the model (Montgomery *et al.,* 2001).

Thus, the dependent or response variable (Y) corresponding to the respondent's condition of understanding (Y = 0) or not understanding (Y = 1) about the content of the SCP messages held in the city was considered as a function of 33 independent or explanatory variables (X_1, X_2, X_3, …, X_{33}) related to the citizens' profile and opinion, and they are summarized in Table 1. For the discrimination of the two groups, the classification rule was considered: If P (Y = 1) > 0.5, then, Y = 1 is classified. Otherwise, it is classified as Y = 0.

Table 1 Independent (or explanatory) variables of the logistic model

Initials	Variable Name
General Information	
X_1	Place of residence
X_2	Level of schooling
X_3	Age group
X_4	Genre
X_5	If the citizen knows the selective collection of the city
X_6	The frequency with the citizen receives information about the selective collection
X_7	If the citizen performs separation of materials
X_8	If the citizen has doubt about the recyclability of materials
X_9	If the citizen deliveries recyclable materials to autonomous waste pickers
X_{10}	If the citizen knows the day the truck passes in the neighborhood
X_{11}	If the citizen knows how selective collection helps the environment
X_{12}	If the citizen knows the municipal cooperative
X_{13}	If the citizen knows that the separation contributes to the economy of the city
X_{14}	If the citizen receives current information on the selective collection of the city
X_{15}	Citizen preference for message size
Media Preferences to Receive Information	
X_{16}	Speaker
X_{17}	Flyers
X_{18}	Booklets
X_{19}	Newspapers
X_{20}	Broadcasting radios
X_{21}	Local TVs
X_{22}	Information sites
X_{23}	Social networks
X_{24}	Other media
Media Preferences for Feedback	
X_{25}	There is no interest in positioning
X_{26}	In person
X_{27}	Telephone
X_{28}	Newspapers
X_{29}	Broadcasting radios

X_{30}	Local TVs
X_{31}	Information sites
X_{32}	Social networks
X_{33}	Other media

Source: prepared by the authors.

The systematization and statistical analysis of the data were performed using *Microsoft Excel Spreadsheets*® and *Minitab Statistical Software*®. The latter calculates an adjusted and optimized model for the multiple logistic regression method, using an interactive algorithm to obtain the estimates of the parameters of interest. In the process of estimating the coefficients of the model, the stepwise method was used to eliminate highly correlated variables and find the best possible combination of independent variables.

For the hypothesis tests mentioned above, a significance level α of 5% was established.

3. Results and discussion

According to the results, all the surveyed citizens had some knowledge of the SCP carried out by the municipal government in partnership with the cooperative. In addition, all of them had seen or heard about the SCP in some of the media broadcasts, mainly in loudspeakers built into cars or trucks (69.1%), in local radios (47.4%) and/or in other media (22.7%).

To verify if the codes, signs or symbols between the sender and the receiver of the information were adequate, it was asked if the surveyed citizens had noticed the content of the transmitted messages. It was found that 88% of respondents had clearly understood the SCP messages held in the city. Williams and Cole (2013) and Berrio-Zapata *et al.* (2016) reported that complex messages can create room for confusion, which was not observed at first in this research.

However, almost 75% of respondents rarely heard of SCPs, showing that the information presented could be insufficient to influence the population's behavior. Matos (2012), Hogarth and Soyer (2015), Romanenko (2016) and Christensen and Nilsson (2018) mentioned that several repetitions of information on a topic in everyday life are necessary for a message to become relevant and can be internalized by an individual.

Then, a logistic regression model was adjusted to indicate which factors related to the citizens' profile and opinion have influenced the individual's understanding of the content of the SCP messages held in the city.

After insertion of the data into the *Minitab software*, the 33 variables observed in Table 1 were analyzed and only six of them (X_4: Genre; X_7 If the citizen performs separation of materials; X_{11}: If the citizen knows how selective collection helps the environment; X_{12}: If the citizen knows the municipal cooperative; X_{13}: If the citizen knows that the separation contributes to the economy of the city; and X_{33}: Citizen preference for other media for feedback) were significant to the response variable according to Table 2. Consequently, non-significant variables were gradually eliminated until the adjusted logistic model described in the following equation was obtained:

$$P\,(Y=1) = \frac{e^{-1.80 + 2.23\,X_{4\_2} + 4.42\,X_{7\_2} + 3.55\,X_{11\_2} + 2.80\,X_{12\_2} - 3.47\,X_{13\_2} - 3.97\,X_{33\_2}}}{1 + e^{-1.80 + 2.23\,X_{4_2} + 4.42\,X_{7_2} + 3.55\,X_{11_2} + 2.80\,X_{12_2} - 3.47\,X_{13_2} - 3.97\,X_{33\_2}}} \qquad (5)$$

The way the explanatory variables are related to the response variable depends on the calculated coefficients. Thus, positive coefficients indicate that according to the answer given, the explanatory variable acts in such a way that the probability of the individual does not understand the content of the SCP message ($P\,(Y=1)$) increases. Negative coefficients indicate the explanatory variable acts in such a way that the probability of the occurrence of the event decreases.

Table 2 Significant explanatory variables to the adjusted logistic model and odds ratio (OR) of an independent variable influencing the response variable Y

Initials	Independent variable	Responses of each variable		Coefficient	p_value (Wald)	OR (response 2 relation to 1)
Constant				-1.80	0.0018	
X_4	Genre	Female (X_{4_1})	Male (X_{4_2})	2.23	0.0032	9.3128 (2/1)
X_7	If the citizen performs separation of materials	Yes (X_{7_1})	No (X_{7_2})	4.42	0.0001	82.9448 (2/1)
X_{11}	If the citizen knows how selective collection helps the environment	Yes (X_{11_1})	No (X_{11_2})	3.55	0.0002	34.9086 (2/1)
X_{12}	If the citizen knows the municipal cooperative	Yes (X_{12_1})	No (X_{12_2})	2.80	0.0034	16.4051 (2/1)
X_{13}	If the citizen knows that the separation contributes to the economy of the city	Yes (X_{13_1})	No (X_{13_2})	-3.47	0.0001	0.0310 (2/1)
X_{33}	Citizen preference for other media for feedback	Yes (X_{33_1})	No (X_{33_2})	-3.97	0.0026	0.0188 (2/1)

Test that all slopes are zero: p-value = 0.001

Source: prepared by the authors.

Therefore, according to the coefficients obtained in Table 2, it is noted that only the variables X_{13} e X_{33} act in a way that the probability of the individual not understanding the content of the message decreases.

The positive coefficient of the variable X_4 (2.23) associated with its odds ratio (OR = 9.3128) suggests that when the respondent is male, the chance of not understanding the message content increases approximately 9 times concerning the female gender. This result corroborates that obtained by Saphores *et al.* (2006), who verified genre was one of the factors that influenced the disposal of waste (in the case of the study, electronic waste) in recycling centers. Then, communication must interfere with how individuals of different genres internalize the message and consequently how they dispose of their waste.

For the variable X_7, the estimated coefficient is also positive (4.42), and in this case, the chance that the individual did not understand the content of the SCP message increases approximately 83 times (OR = 82.95) when the respondent does not perform the separation of materials at home, compared with the one that performs it.

The variable X_{11} also presents a positive coefficient (3.55), meaning that when the respondent does not know how the selective collection helps the environment, the chance of not understanding the message content increases about 35 times (OR = 34.91) concerning the one who knows the benefit of selective collection for the environment. In the studies by Tucker (2001) and Lyas, Shaw and Van-Vugt (2004), similar results were observed, because the authors verified that for the separation of the residues to occur correctly, the pro-environmental behavior and motivation of the actors involved need to be strengthened during the communication process.

With the positive coefficient (2.80) associated with the odds ratio for the variable X_{12} (OR = 16.41), the model suggests that if the citizen does not know the cooperative of the city, the chance of not assimilating the message content increases by 16 times compared to the one who knows the cooperative. Here, the importance of strengthening the dissemination to the population about the existence and objectives of the partnership between the municipal government and the cooperative is observed, highlighting the benefits and its importance for the city.

In the case of the variable X_{13}, the estimated coefficient is negative (-3.47), suggesting that the probability that the respondent did not understand the content of

the message decreases by 97% (OR = 0.03) when the respondent is unaware that the selective collection would help in the economy of the city.

The knowledge about these benefits would contribute to a better understanding of the content of the message. In this way, it follows that the citizens may already have a preconception about the selective collection and they do not pay attention or even ignore the content of the SCP messages. Besides, some authors highlighted when the messages are complex, they could generate space for confusion (Williams; Cole, 2013; Berrio-Zapata *et al.*, 2016).

The variable X_{33} also has a negative coefficient (-3.97) and, associated with the odds ratio, suggests that the chance of the respondent not having understood the message content decreases by 98% (OR = 0.02) when the citizen says that it does not prefer other means of communication for feedback (that is, it prefers the means commonly used). Because SCP information is usually transmitted by traditional media, those who do not use it may not understand the message content by other means. Thus, the idea of particularizing municipal communication strategies proposed by Cezar (2018) is ratified in this study.

Finally, with regard to the adjustment of the model, an analysis of the general regression using the likelihood ratio was performed. This ratio tests the null hypothesis that all the coefficients associated with the explanatory variables are equal to zero versus the alternative, that at least one of them is not null. As the p-value is equal to 0.001, there is sufficient evidence to affirm that at least one of the coefficients is different from zero.

The goodness-of-fit tests presented p-values greater than the 5% significance level. Then, the tests do not reject the null hypothesis of adequate fit of the logistic model to the data. In addition, the quality of the adjustment was evaluated based on the matching of the observed data and the values of the responses obtained. These may be concordant pair (when it is estimated that a respondent who did not understand the messages has a high probability of not understanding the messages), discordant pair (when the opposite is true), or tied pair (when the odds are equal). In this sample, there are 12 respondents who did not understand the messages and 84 who understood them, resulting in 12 × 84 = 1008 pairs. Besides, the adjusted model had a predictive capacity of almost 92%, confirming the evidence of a good adjustment. Regarding the association between the observed responses and the probabilities predicted by the logistic model, the correlation coefficients (Somers D, Goodman-Kruskal Gamma, and Kendall's Tau-a indexes) present values greater than 0.7, indicating that the adjusted logistic model has a good capacity to predict the probability of the occurrence of response variable Y.

4. Conclusion

From a logistic regression model with satisfactory estimates and good adjustment to the data, the study provided important results to verify the characteristics that resemble individuals, and that can impede them from understanding the content of the SCP messages held in a city.

The interference of the variables pointed out by the regression to the condition of the individual in assimilating the content of the messages reaffirms that one must consider the heterogeneity of the population and its peculiarities as a strategy to the communicational process since only when the message is internalized by the individuals, there will be a change of postures.

In this case, measures of adequacy in the communication of the SCP could be planned so that the public policies of social mobilization in waste management are more successful.

Informative materials and awareness campaigns continuously showing to the population the importance of the selective collection to the environment and the city's economy could increase the adherence to the SCPs and contribute to municipal waste management, reducing the negative environmental impact of the cities and promoting sustainable development.

Finally, it should be noted that the proposed methodology has the potential to be used or expanded to other populations.

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RESUMO:
Considerando o aumento da geração de resíduos sólidos em todo o mundo, a coleta seletiva de resíduos é uma das iniciativas que promovem a logística reversa desses materiais, de forma a reduzir os impactos ambientais. No entanto, mobilizar a população para promover a devolução desses resíduos tem sido uma tarefa difícil entre os gestores públicos. Somente a comunicação implementada estrategicamente, não tratada de forma única para atingir todos os públicos, pode contribuir para o sucesso dos programas de coleta seletiva. Assim, objetivo deste trabalho é identificar variáveis significativas, a partir da opinião dos indivíduos, que impedem a compreensão do conteúdo das mensagens veiculadas nos programas de coleta seletiva. Para isso, foi realizado um estudo de caso em uma cidade localizada no estado de São Paulo, Brasil. Como ferramenta de análise estatística foi utilizada a regressão logística múltipla, na qual a variável resposta (capacidade do indivíduo em compreender o conteúdo das mensagens) é considerada como função de 33 variáveis explicativas. A partir da análise dos dados, obteve-se o modelo logístico mais adequado com capacidade preditiva de quase 92%, onde seis variáveis explicativas (Sexo; Se o cidadão realiza separação de materiais; Se o cidadão sabe como a coleta seletiva ajuda o meio ambiente; Se o cidadão conhece a cooperativa municipal; Se o cidadão sabe que a separação contribui para a economia da cidade; e, Preferência do cidadão por outras mídias para feedback) foram significativas para a variável resposta. Os resultados mostraram que há interferência de variáveis na capacidade do indivíduo de compreender o conteúdo das mensagens, indicando que em um processo comunicacional é necessário levar em consideração as peculiaridades e heterogeneidade da população para atingir o objetivo pretendido.

PALAVRAS-CHAVE: Comunicação, Mobilização Social; Coleta Seletiva; Resíduos Sólidos Urbanos; Regressão Logística.

RESUMEN:
Considerando el aumento en la generación de residuos sólidos en todo el mundo, la recolección selectiva de residuos es una de las iniciativas que promueven la logística inversa de estos materiales, con el fin de reducir los impactos ambientales. Sin embargo, movilizar a la población para promover la devolución de estos residuos ha sido una tarea difícil entre los gestores públicos. Sólo la comunicación implementada estratégicamente, no tratada de forma única para llegar a todos los públicos, puede contribuir al éxito de los programas de recogida selectiva. Así, el objetivo de este trabajo es identificar variables significativas, basadas en la opinión de los individuos, que impiden la comprensión del contenido de los mensajes transmitidos en los programas de recogida selectiva. Para ello se realizó un estudio de caso en una ciudad ubicada en el estado de São Paulo, Brasil. Como herramienta de análisis estadístico se utilizó la regresión logística múltiple, en la que se considera la variable respuesta (la capacidad del individuo para comprender el contenido de los mensajes) en función de 33 variables explicativas. Del análisis de los datos se obtuvo el modelo logístico más adecuado con una capacidad predictiva de casi el 92%, donde se incluyen seis variables explicativas (Género; Si el ciudadano realiza separación de materiales; Si el ciudadano sabe cómo la recogida selectiva ayuda al medio ambiente; Si el ciudadano conoce la cooperativa municipal; si el ciudadano sabe que la separación contribuye a la economía de la ciudad; y, la preferencia del ciudadano por otros medios para su retroalimentación) fueron significativas para la variable respuesta. Los resultados mostraron que existe interferencia de variables en la capacidad del individuo para comprender el contenido de los mensajes, indicando que en un proceso comunicativo es necesario tener en cuenta las peculiaridades y heterogeneidad de la población para alcanzar el objetivo buscado.

PALABRAS CLAVE: Comunicación, Movilización Social; Recogida selectiva; Residuos sólidos urbanos; Regresión logística.