IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
ISSN: 2319-2402, ISBN: 2319-2399. Volume 1, Issue 3 (Sep-Oct. 2012), PP 27-32
www.iosrjournals.org

Study of Influencing Factors of the Consumer Separation Behavior

Helen Morabi Heravi[1], Mohd Bakri Ishak[2], Ahmad Makmom Hj Abdullah[3], Amir Hossein Mahvi[4],Mohamad Reza Sabour[5], Ramdzani Abdollah[6]
[1,2,3,6] *(Environmental Management, Environmental Study/ Universiti Putra Malaysia, Malaysia 43300)*
[5]*(Environmental Engineering, Civil Engineering/ K.N.Toosi University, Tehran, Iran 1346)*
[4]*(School of Public Health, Tehran University of Medical Sciences, Tehran, Iran)*

Abstract: *Traditionally, separation behavior in Iran has included mainly the removal of dry bread and textiles from wet waste. Two thousand tons of recyclable materials were collected in selected areas of Tehran in 2012 by 3,682 households trained in this collection sampling. Waste separation comprises about 299 kg of recyclable materials per capita collected from these households per year. The sample size obtained for the Cochran formula was 380. After sampling and questionnaires were distributed, it was found that only 260 households had carried out any waste separation, so the hypothesis testing was based on the answers of these householders. Simple random sampling was used, i.e., two-dimensional* χ^2 *Chi-square test for determining the relationship between the indicators used. The result obtained showed that encouraging children to separate waste was very low, and the main reason that the majority of respondents chose for collecting and separating waste from buyback centers was to earn money from it and because of the proximity of these centers to their houses. Most respondents also tended to spend less than five minutes reaching the waste disposal location, so the householders mostly preferred bins at the curbside. Also, the majority of respondents in eight-unit residential complexes the extent of separation was low, and of those living in nine-unit complexes or larger, was very low.*

Keywords: Source separation, Separation behavior; Public participation

I. INTRODUCTION

The aim of all source separation programs is to separate materials before they are infected [1]. Increasing waste in urban and residential areas, and exorbitant fees for collection and disposal, create both health and economic problems. The results of uncontrolled waste demonstrate the necessity of finding effective measures to control waste.

In the past, in our traditional culture and for religious reasons, it has been customary to separate waste materials to avoid profusion and extravagance. However, with industrial development, relative prosperity, and extravagance, less attention has been given to this issue. But today, with population growth and our scientific knowledge about declining natural resources, the subject of waste separation in cities has been firmly placed on the agenda.

Although the factors influencing householders' waste separation behavior are generally well understood, our understanding derives primarily from research that has considered households or householders as discrete, individual entities. For example, research about consumer behavior with respect to reusing waste materials is supported by waste separation program evaluation. Social, economic, cultural, environmental, structural, technical, and health indicators are effective in waste separation programs. These criteria for analysis and design are used for waste separation systems [2;3].

Contributing factors in increasing or decreasing the function of waste separation include this factors including: frequency, distance to the location, population, avoidance of separation, a customization to separation, motivation, and the institutional framework. These factors are very important with regard to separation behavior, and can increase or decrease the level of waste separation per capita. This means that the separation behavior not only depends on technical aspects but also on organizational aspects [4, 5, 6, 7, 8].
The right attitude promotes the recycling process. Awareness and education encourage a significant increase in improved separation behavior. The variables include: public commitment, setting achievable goals, removing barriers, providing rewards, and obtaining feedback on all of the separation behavior. Evaluating social interactions that relate to the waste separation behavior of each householder as an individual entity in the same social conditions is essential [9,10].

At the beginning of the first decade of the 21st century, in 2000, the number of projects established by the Tehran municipality in order to organize the separation and collection of dry waste were considerable. During those 10 years, they were developed and implemented with the coordinating departments concerned

within the Tehran municipality, and have been largely successful so far. However, over the first several years of experience with the dry waste separation scheme in the Tehran municipality, several factors arose. As a result of carrying out source separation programs it became clear that consumer behavior was an influencing factor in the degree of public participation in the waste separation program. The focus of this study has been to examine this relationship. The sampling area is in the Shemiran area in the northernmost part of Tehran-Iran; neighborhoods in this area include Zaferanieh, Mahmudieh, Evin, and Darakeh.

The aim of this study is to examine the factors influencing consumer behavior in a source separation program with public participation. The kind of house, type of location, time taken to reach the location, and types of motivation are identified as having an effect on public participation and other factors in terms of the extent of the separation, the cause of separation, and selection of location, identified as factors of separate behavior.

II. MATERIAL AND METHOD

The buyback center system; curbside sorting collection and door-to-door services are a source separation initiative undertaken in Tehran City. With the cooperation of the buyback center system, recyclable material is collected as co-mingled materials of paper, glass, metal, and plastic. Citizens who keep their recyclable materials separate and sell it to the center receive either promotional materials or a ticket for earn money.

The curbside sorting collection is a reuse system undertaken in Tehran. In co-mingled collection, sorting will result in a quality product to sell to industry. Curbside collection sorting of recyclable materials was started as a youth employment project over 30 years ago.

The door-to-door services collection system is a reduction system undertaken in Tehran; Weekly loading is utilized. Citizens deliver recyclables using blue polyethylene bags, with recyclable materials separated as a co-mingled for the scavenger.

A questionnaire was completed in urban areas and residential complexes in the north of Tehran and investigated four hypotheses. The samples included the more affluent segments of society with an intellectual level of awareness of environmental issues and urbanization living in apartments.

The χ^2 test was used to examine independent and dependent variables due to separation, type of housing, and type of location related to the extent of separation and the time taken to reach the location. Four hypotheses were explored. The factors that can be very effective with respect to waste separation are social, economic, cultural and technical factors. Public participation in separation behavior is considered an independent variable. Social and equipment factors are considered dependent variables, whereas training is considered an affective variable.

The statistical methodology used includes descriptive statistics and retrospective and inferential statistics. The questionnaire completed included 19 questions with four options and one open answer question. Householders were asked to fill in their answers on the answer sheet provided. The questionnaire was self-prepared following discussions with scholars. The availability of the questionnaire as analyzed by the KMO test was 0.88, which indicated that the questionnaire had good validity. Calculation of reliability of the questionnaire was determined by Cronbach's alpha and was 0.91, thereby indicating that the questionnaire had a good level of reliability. Data was analyzed by SPSS software.

Because the data is non-parametric and the variables are nominal, the two-dimensional χ^2 test (Chi-square) was used to test the hypothesis. Generally the Chi-square test helps to determine whether the independent variables are related to separation behavior, but does not explain the strength of the relationship or, if approved, the correlation between the two variables. χ^2 test (Chi-square) was developed using the following equation (1) was used :

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}(O_{ij} - E_{ij})/E_{ij} \quad (1)$$

The degree of freedom of the components of the variables is independent of the amount, where K is the number of rows and I equal the number of columns, the following equation (2) was used:

$$\text{d.f.} = (K-1)\,(l-1) \quad (2)$$

Simple random sampling was used for this study, as this type of sampling of each member of society has the best chance of being independent. In order to be independent, the choice of a member selected was not affected by any other members of the community. First a list of all members of the community was obtained, and then each of the number required was assigned a score with tables of random numbers selected. To determine the sample size of the Cochran statistical formula, the following equation (3) was used:

$$\mathrm{n} = \frac{N.t^2.pq}{N.d^2 + t^2.p.q} \quad (3)$$

The sample size in this study was 380 people. The Cochran formula was obtained after sampling and questionnaires had been distributed and it was realized that only 260 of these persons carried out any waste

separation. So the hypotheses were tested based on answers from these persons. The hypotheses in this study included measures affecting factors about the extent of the separation and study motivations for waste separation.

III. RESULT

To determine the sample size of the Cochran statistical formula the following process was used: The percentage of those who have the trait studied (p)=0.5 ,the percentage of people who are lacking in the trait studied (q)=0.5, the difference and accuracy that is accepted for the parameter (d)=0.05, t is obtained based on the percentage of trust(t)=1.96 and the volume of the statistical society(N)=3682.

The first hypothesis, that most people do source separation because they are motivated to protect the environment was true for 42% of the people surveyed, those who do it due to concerns about sorting the waste was 34%, those doing it to earn money from it was 19%, and those encouraging their children to do it was 5%.Those who do it sometimes due to motivations of environmental protection was14%, those concerned about sorting the waste was 23%, those who earn money doing it was 43%, and those who encourage their children to do it was 20%. Those who do separation with the motivation of environmental protection was low at 13%, those concerned about sorting the waste was 14%, those who earn money from separation was 64%, those who encourage their children to do waste separation was 9%. Those who do separation with the motivation of environmental protection was very low at 3%, those concerned about sorting the waste was 3%, those who earn money from separation was 71%, those who encourage their children to do waste separation was 23% (Table 1). Statistically, χ^2 (Chi-square) = 95.415, degrees of freedom (d.f.) = 9, significance level = 0.00 and Cramer's coefficient (Cramer's v) = 0.35 (Table 2).

The second hypothesis was that most people who carry out waste separation spend less than five minutes going to and from the recycling location. Those disposing of it at the curbside was 75%, by a collection service was 21%, taking it to buyback centers was 4%, and taking it to chain stores was 0%. Those who were spending 5-10 minutes going to and from the curbside was 44%, collection was 40%, buyback centers was 16%, and chain stores was 0%. Those who spend between 10-15 minutes going to and from the recycling location using the curbside bins was 28%, collection was 27%, buyback centers was 35%, chain stories was 10%. Those who were spending more than 15 minutes going to and from the curbside was 15%, collection was 20%, buyback centers was 30%, chain stores was 35% (Table 1). Statistically, χ^2 (Chi-square) = 1126, degrees of freedom (d.f.) = 9, significance level = 0.00, and Cramer's coefficient (Cramer's v) = 0.38 (Table 2).

The third hypothesis was that those who carry out waste separation for environmental reasons showed that those who dispose of it at the curbside was 0%, collection was 50%, buyback centers was 50%, and chain stores was 0%. Those who do it due to their concern about sorting the waste at the curbside was 70%, door-to-door was 30%, buyback centers was 0%, and chain stores was 0%. Those who encourage their children to take the separated waste to curbside bins was 100%, collection was 0%, buyback centers was 0%, chain stories was 0%. Those who earn money from waste separation and disposal at the curbside was 47%, collection was 25%, buyback centers were 20% and chain stores was 8% (Table 1). Statistically, χ^2 (Chi-square) = 107.7, degrees of freedom (d.f.) = 9, significance level = 0.00, and Cramer's coefficient (Cramer's v) = 0.608 (Table 2).

The fourth hypothesis referred to the homes that most people who carry out waste separation come from. Four-unit complexes were 36%, eight-unit complexes were 30%, nine or more unit complexes were 24%, and single residential urban houses were 10%. Those who were sometimes doing it in four-unit complexes was 34%, those eight-unit complexes was 66%, nine or more unit complexes was 0%, and single residential urban houses was 0%. Those who carry out low levels of waste separation from four-unit complexes was 0%, from eight-unit complexes was 100%, from nine or more unit complexes was 0%, and from single residential urban houses was 0%. Those who carry out very little waste separation and who live in four-unit complexes was 0%, from eight-unit complexes was 3%, from nine or more unit complexes was 97%, from single residential urban houses was 0% (Table 1). Statistically, χ^2 (Chi-square) = 287.9, degrees of freedom (d.f.) = 9, significance level = 0.00, and Cramer's coefficient (Cramer's v) = 0.608 (Table 2).

IV. DISCUSSION

In this study, the relationship between the cause of separation and the extent of separation was relatively good. Most of those who carried out waste separation because they were motivated to protect the environment and were concerned about sorting and separating the waste and the number of those who encourage their children or earn money from waste separation were very low. Most people disposed of their waste separately because they were environmentally aware and concerned about sorting the waste and carrying out source separation often. The number of those who encouraged their children was very low (Table 1). It seems that most respondents chose to earn money for their waste separation only because of the proximity of the buyback centers to their homes.

Second, the relationship between the time it took to reach the location and the selection of the location is fairly close, and the majority of respondents tended to spend less than five minutes to deliver their separated waste. The majority of respondents tended to spend less than five minutes for delivery, and most respondents preferred to take the waste to the curbside rather than spend time on door-to-door or chain stores (Table 1).

Third, the relationship between the cause of separation and the selection of location is fairly close, and the majority of respondents tended to earn money from buyback centers because of the proximity of these centers to their houses. The majority of respondents selected buyback centers because of their proximity to the location of their house. Also, most people preferred the curbside location (Table 1). Suitable bins had a direct effect on carrying out better waste separation.

Fourth, The relationship between the kind of house and the extent of separation is very close, and the majority of respondents lived in eight-unit complex residential housing where the extent of the separation is low; extent of separation in nine unit ore more complexes is also very low (Table 1). The sample selected urban areas and residential complexes for the sampling. The sample included the affluent segments of society with a greater intellectual level of awareness of environmental issues. Education had a direct effect on separation behavior. Providing waste separation chutes for recyclable materials on each floor of apartment blocks also had a direct effect on increasing the waste separation in residential complexes.

Table 1: The factors influencing on consumer separation behavior

The extent of separation / The cause of separation	Most	Sometimes	Low	Very Low	Total
Environmental Protection	25	5	7	3	40
Concern about sorting the waste	20	8	8	4	40
Encourage their children	3	7	5	25	40
Money	11	15	36	78	140
Total	59	35	56	110	260

Spent time / Types of location	Less than 5 min	Between 5-10 min	Between 10-15 min	More than 15 min	Total
Buyback center	6	8	14	6	34
Door-to-door services	32	20	11	4	67
Curbside sorting	112	22	11	3	148
Chain stores	0	0	4	7	11
Total	150	50	40	20	260

The cause of separation / Type of location	Environmental Protection	Concern about sorting the waste	Encourage their children	Money	Total
Buyback center	20	0	0	28	48
Door-to-door services	20	12	0	35	67
Curbside	0	28	40	66	134
Chain stores	0	0	0	11	11
Total	40	40	40	140	260

The extent of separation / The kinds of houses	Most	Sometimes	Low	Very Low	Total
Single residential houses in urban	6	0	0	0	6
Complex of 4 units	21	12	0	0	33
Complex of 8 units	18	23	56	3	100
Complex of 9 units or more	14	0	0	107	121
Total	59	35	56	110	260

Table2: Statistic of χ^2 (chi–square) for four hypotheses First hypothesis

Statistic	Two-variable of the extent and the cause of separation
($^2\chi$) Statistic of chi - square	95.415
(d.f) Degrees of freedom	9
Significant level	0
Coefficient of Cramer's v	0.35
Second hypothesis	
Statistic	Two-variable spend time and type of location of separation
($^2\chi$) Statistic of chi - square	112.6
(d.f) Degrees of freedom	9
Significant level	0
Coefficient of Cramer's v	0.38
Third hypothesis	
Statistic	Two-variable of types locations and the cause of separation
($^2\chi$) Statistic of chi - square	107.7
(d.f) Degrees of freedom	9
Significant level	0
Coefficient of Cramer's v	0.372
Forth hypothesis	
Statistic	Two-variable of the extent of separation and types of houses
($^2\chi$) Statistic of chi - square	287.9
(d.f) Degrees of freedom	9
Significant level	0
Coefficient of Cramer's v	0.608

V. CONCLUSION

The statistical test was a Chi-squared test that was examined sampling distribution that whether meets an expected distribution or not. It seems from results that those who mostly separated their waste were more motivated by environmental concerns, and those who did little separation were more motivated by money but hasn't been determined the strength or direction of the relationships. Also in general, increased public participation, with appropriate training on compliance as well as relevant technical information, would encourage people to carry out waste separation more effectively, and a suitable place for source separation had a direct effect on carrying out better waste separation.

Acknowledgements

The authors acknowledge the assistance of the Tehran municipality in providing data and additional support. The comments of the anonymous reviewers are also gratefully acknowledged. The authors especially wish to thank Leyla Farjam for her cooperation.

REFERENCES

[1] Lund, H.F., 2001. *Recycling Handbook* (second ed. McGraw-Hill, Washington,DC).
[2] Shaw Peter J (2007) Nearest neighbour effects in kerbside household waste recycling. *Resources, Conservation and Recycling*, 52: 775-784. doi:10.1016/j.resconrec.2007.11.004.
[3] Thøgersen John (2002) A model of recycling behaviour, with evidence from Danish source separation programmes. *International Journal of Research in Marketing*, 11: 145-163.
[4] Chung Shan-shan , Poon Chi-sun (1999) The attitudes of Guangzhou citizens on waste reduction and environmental issues. *Resources, Conserv. Recycling*, 25: 35-59.
[5] González-Torre Pilar L, B Adenso-Díaz, Alex Ruiz-Torres. (2003) Some comparative factors regarding recycling collection systems in regions of the USA and Europe. *Journal of Environmental Management*, 69: 129-138.
[6] González-Torre Pilar L, B. Adenso-Díaz. (2005) Influence of distance on the motivation and frequency of household recycling. *Waste management*, 25: 15-23.
[7] Martin M , I.D. Williams, M. Clark. (2006) Social, cultural and structural influences on household waste recycling: A case study. *Resources, Conservation, and Recycling*: 48.
[8] Refsgaard Karen, Kristin Magnussen. (2008) Household behavior and attitudes with respect to recycling food waste – experiences from focus groups. *Journal of Environmental Management*, 90: 760-771.
[9] Schultz P.Wesley , Stuart Oskamp, Tina Mainieri. (2004) Who recycles and when? A review of personal and situational factors. *Journal of Environmental Psychology*, 15: 105-121.
[10] Hornik Jacob, Joseph Cherian, Michelle Madansky, Chem Narayana. (2002) Determinants of recycling behavior: A synthesis of research results. *The Journal of Socio-Economics*, 24: 105-127.