The effect of training on public participation in the in-house separation of urban wastes

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Abstract

Recycling and reusing urban wastes are of the most important pillars of waste management. In this respect, training has an important role in motivating and changing people's behavior. This study was conducted to examine the effect of training on public participation in the in-house separation of urban wastes in the 5th municipal district 5 of Tehran. In this study, 300 families resident in this district were randomly selected. They were divided into three equal groups of workshop training, brochures training and the without training group; their motivational factors for participation in this plan were investigated using questionnaires. The workshop and brochure training groups referred to the time-consuming nature of waste separation, the lack of space in apartments, the irregular collection of wastes, and the unfruitfulness of the separation as the most important discouraging factors. Encouraging people, paying the costs and providing a healthier environment were noted by the educated people as the most important motivational factors. Brochure training, after workshop training, played an effective role in attracting public participation in this plan. The lowest public participation in this plan was recorded for the untrained group. The research results indicate that training, particularly workshop training, has a significant effect on motivating and improving individuals' waste separation behavior.

Keywords: Public Participation, Training, Urban,Waste

Introduction

Environment protection was conceived of as an important issue for realizing national security, economic welfare and social justice, and new ideas and policies were introduced in this respect in the mid-1980s [1,2]. Urban waste management was among programs transformed through an increasing emphasis on recycling and the in-house separation of wastes. Recycling and using the materials in urban wastes are today considered as one of the most important aspects of waste management in urban societies [3,4]. The most economical and principled type of urban waste recycling occurs when these materials are separated in the house and by the producers themselves. Reaching this goal requires citizens' comprehensive participation and cooperation, and creating the necessary infrastructures in the field of recycling by municipalities and respective, including public and private, institutions. The lack of any of these factors delays, or indeed,

leads to the failure of, the plan [5-7]. One of the most important ways for drawing public participation and cooperation in health plans is training and improving the public's knowledge in this field [8,9]. Pioneer countries' experience in the field of in-house separation and urban waste recycling shows the fact that training and public culture making plays an important role in motivating and changing people's positive behavior [10]. Sweden's experience proves that after 5 years of training and increasing public awareness, in-house glass and paper separation is today considered as a common practice among people [11]. Citizens should be trained such that they produce less waste, and perform the initial separation of wastes at the production site. In-house separation is effective when it is performed by the public and through their large participation. Participation in the source separation at a macro level requires people taking responsibility for separating the waste into different components. Therefore, all motivational factors which increase public participation in waste separation should be considered [11-13]. Motivational factors for drawing public participation are divided into internal (attitude and accountability) and external (awareness and improving the knowledge level) factors. Attitude shows individuals' positive and negative inclination toward a subject while accountability denotes individual's direct relation with moral concepts such as the environment protection. Improving the knowledge level (external motivational factors) is among the main strategies for behavior modification. Improving the public's awareness changes their attitude and then corrects their behavior. Offering information about an environmental subject can be used as a strategy for reducing problems of environmental projects. Awareness about the in-house separation and its health and economic advantages is a necessary condition for attracting public participation and cooperation. This information can be offered to individuals through training pamphlets and brochures, face to face training, and radio and TV programs [14,15]. Studies have recognized individuals' concerns about the environment and motivational factors for the emergence of environmental behaviors as effective motivational factors. For example, such motivational factors were recognized in Sweden and Malt [16]. In Sweden, the people's recycling behavior was influenced by both internal factors, i.e. attitude and accountability; though, attitude had a particular importance. The research in Malt showed that the internal factors of attitude and accountability did not play a significant role in recycling behavior; while external factors like raising awareness were effective [16]. Rodbari et al. [17] conducted a study about collecting in-house separated waste by private organizations and public participation in Shahrood city. In this research, initially necessary trainings about in-house waste recycling, waste delivery to the collecting agents, receiving lottery tickets and rewards were offered to people. The results indicated that in the first and second months of the plan, 70% and 87.7% of the people performed waste separation, respectively. Also, people's awareness about the importance of waste collection and healthy disposal was improved. A study by Naqavi and Hasani [18] in 2005 showed that this plan was not profitable. Their results showed that if the culture of waste separation and recycling of the household develops, and the training costs are cut, the plan will reach the required profitability after some years.

It seems that studies conducted so far in the country about in-house urban waste separation have mainly been concerned with determining the economic value of these plans and the resultant savings, and no particular attention has been paid to increasing public participation. The main objective of this research is to examine the effect of training on public participation in in-house urban waste separation in the 5th municipal district of Tehran. In this study, individuals' motivational factors and accountability for participation in this plan were examined to be later used for reforming and improving the existing methods.

Method

In this cross-sectional study, the effect of training on public participation in in-house waste separation among the selected individuals of the seven quarters of the 5th municipal district of Tehran was examined. District 5 is the second largest district in Tehran, with an area of 5287 acres, 7 quarters, 29 neighborhoods, and the population of 680,000 according to the latest census. This district is located in the northwest of Tehran, bordering from south on the Karaj Highway, from north on the Alborz Mountains, from south on the Kan River and district 22, and from east on Mohammad Ali Jenah and Ashrafi Esfahani Highways.

Considering the type I error α as 0.05, the estimate of the quality attribute of in-house waste separation as 80%, and the acceptable error d in the estimation of the relevant value as 0.1, the smallest random sample size was 62, but 100 people was considered as sample size using cluster sampling method and the plan's effect factor of 1.5. After determining the sample size of 100 and dividing it by seven quarters, the share of each quarter was determined 14-15, and the samples were cluster-randomly selected.

The Margaret Fenech Questionnaire [16], which was used in Sweden and Malt, was employed to evaluate the extent of people's inclination and motivation for participation in the in-house waste separation plan. The questionnaire consisted of 15 items; the initial 9 items were about people's internal and external motivational factors, which included closed and semi-closed questions (essay and multiple choice questions). The final 6 questions were about participants' social and economic knowledge.

The questionnaire's validity was examined though translation, back-translation and assessing understandability. After translators' discussions, correction of possible mistakes, and the final approval by the relevant experts, the corrected Farsi version of the questionnaire was produced. Its reliability was determined through a pilot test. The questionnaire was completed by 30 individuals at two points with a two-week interval. The correlation efficient was about 75%.

Ethical codes were observed by obtaining the approval of the Ethics Committee of the university, and a recommendation letter from the faculty. Before completing the questionnaire by the selected individuals, they were briefed about the research objectives, the confidentiality of the results, and signed written informed consent.

The participants were divided into three equal groups of workshop training, brochure training, and untrained. 100 people were selected for each group. In the first group (workshop training), people interested in the course were registered after distributing training packages and the initial explanations made by the recycling organization experts. Three training workshops were held in three successive weeks by the recycling organization experts of district 5 about wastes and the methods for reducing them, the in-house separation plan and its advantages, the current recycling state of Tehran and the recycling organization's performance. In the end, the trained individuals completed and submitted the project's questionnaires. In the second group (brochure training), initially books, brochures and training catalogues were distributed among them. Then, the completed questionnaires were collected. In the third group (the untrained), 100 questionnaires were distributed among individuals and collected after completion, without offering any training. The resultant data were finally analyzed by the Excel and SPSS software programs.

Results

According to the statistics of the Tehran Municipality [18], the volume of the urban wastes in 2005-2008 shows an increasing trend in most districts of Tehran (Table 1). The highest change percentage, in particular in 2007-2008, belongs to district 5 of the Tehran Municipality, which shows a 25% increase in waste production.

Table 1 *The Production of Urban Wastes (1000 tons per year) in Tehran's Districts in 2005-2008*

District	2005	2006	2007	2008	The change percentage in 2007-2008
1	126	126	131	139	6
2	170	186	223	249	12
3	113	110	113	115	2
4	217	212	212	219	3
5	167	168	173	216	25
6	106	102	108	112	4
7	97	95	95	96	1
8	95	91	88	94	7
9	51	59	63	61	-3
10	98	95	103	101	-2
11	91	94	97	97	0
12	123	124	130	138	6
13	84	65	56	68	22
14	112	110	102	112	10
15	206	180	165	180	9
16	80	84	93	107	15
17	111	119	114	107	-6
18	96	90	92	107	16
19	94	93	97	87	-10
20	172	164	163	159	-3
21	38	56	65	65	0
22	35	29	28	29	2

Figure 1 shows the amount of collected dry wastes in district 5. In this district, 13k tons of wastes have been collected monthly; according to the latest analysis, 24.7% of this amount consist of valuable dry wastes. The monthly potential of this district for the production of valuable dry waste is equal to 3155 tons, 2500 tons of which are monthly separated.

The participants' responses about encouraging, motivational and discouraging

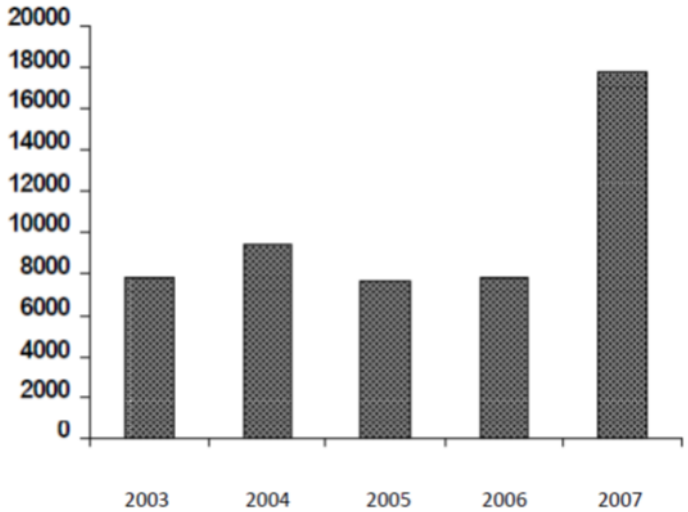

Figure 1 *The Amount of Dry Waste Collected in District 5 in 2003-2007*

Table 2 *The Responses of the Training Groups Regarding the Encouraging Factors*

Training Group	Responses
Workshop training	Advertisement and having a lot of information about environmental pollutions Interest in the environment protection and reducing wastes' side-effects Increasing productivity from wastes, not losing national capital and returning it The recyclability of dry wastes and assistance in recycling materials The timely delivery of dry wastes The delivery of additional waste bags by the municipality Legal action against unauthorized agents of waste separation Having a good feeling Financial encouragement and paying the costs to citizens at the beginning of the implement of the plan Attention to the society's values and helping the country's progress.
Brochure training	A human duty Respect for the environment Paying the costs of in-house waste separation by the government
No training	Giving rewards and training materials to students Advertisement Paying more for wastes

Table 3 *The Responses of the Training Groups Regarding the Motivational Factors*

Training Group	Responses
Workshop training	Advertisement and informing the public for having a healthy environment Having a lot of information about environmental pollutions, and informing about environmental consequences Assistance in the environment preservation and keeping it healthy Preventing the squandering of national capital The timely arrival of the agents to empty houses' trash bins and collect the wastes Increasing the payment for the purchase of recycled wastes Recyclability and preciousness of some wastes and reusing them Saving paper and plastic, etc. High social motivation and participation in a good deed Educating and culture making through brochure distribution and holding training workshops The financial encouragement of families or selecting excellent citizens The proper acquaintance of citizens with waste separation and its positive and effective consequences Acquaintance with the application of separated wastes and the problems of non-separated wastes The availability of waste separation facilities such as bags, containers and separated bins The sense of responsibility, understanding the necessity of this task which is, in fact, a kind of self-assistance The timely and regular collection of wastes The existence of sufficient space and proper systems for waste separation in apartments More welfare for the present and the future Offering better services and commodities in recycling sites The tidiness, cleanliness and hygiene of houses
Brochure training	Advertising and informing the public for having a healthy environment Proper training The timely arrival of the agents to empty houses' trash bins and collect the wastes The financial encouragement of families, or selecting model citizens, or offering discounts on annual municipality tolls The availability of waste separation facilities such as bags, containers and separated bins Assisting the country's culture Assisting the government in waste separation Enjoying spiritual and material rewards Assistance in the environment preservation and preventing its pollution Observing the city's hygiene and cleanliness
No training	The hygienic and prompt transfer of wastes Assisting the environment Training through TV programs Having sufficient information and awareness

factors are presented in Tables 2,3 and 4, being divided among workshop training, brochure training and untrained groups. As is clear, the responses presented by the workshop training group are more comprehensive and scientific than the two other groups.

Table 4 *The Responses of the Training Groups Regarding the discouraging Factors*

Training Group	Responses
Workshop training	The lack of the timely and regular collection of wastes
	The bulk and foul smell of dry wastes and the lack of space in houses for the separation
	The lack of facilities for the in-house separation and storage of wastes for a long time
	The fear of the unfruitfulness of the separation
	The inaccessibility of bags and bins in different parts of the city
	The transport of dry wastes to unauthorized factories by illegal agents
	The lack of culture making
	Other people's negligence and the unfruitfulness of an individual work
Brochure training	The lack of the timely and regular collection of wastes
	The bulk and foul smell of dry wastes and the lack of space in houses for the separation
	Feeling embarrassed of carrying wastes publicly
	The lack of facilities for the in-house separation and storage of wastes for a long time
No training	The lack of the timely and regular collection of wastes
	The bulk and foul smell of dry wastes and the lack of space in houses for the separation
	Not having sufficient information

Discussion

The results of the first question (having environmental activities) made it clear that few people in the three groups had a prior engagement in environmental activities. Therefore, the majority of the participants lacked any background of environmental activity. Regarding the destruction of the environment (the second question), training, in particular the first kind of training, i.e. workshop training, has had the biggest effect on creating the feeling of concern and responsibility about destroying the environment. Regarding the third question about worries over waste disposal in Kahrizak, little to very important options were designed. According to the responses of the three groups, most concerns were expressed by the workshop training group. The results show that the workshop training group opted mainly for the very important option. Accordingly, workshop training had the most effect on generating the concern over the current state of waste disposal. In question 4, the issue at stake was the direct responsibility of the responsible organizations for solving the problem of wastes. The results show that an almost uniform distribution exists in the responses to this question, which indicates the participants in all three groups had little information about the responsible organizations. Question 5 was about the participants' view of the implementing the waste management plan. The answers form a spectrum of options, from the usefulness of the plan, needing more efforts, to disappointment and lack of knowledge. According to the results, the workshop training and the brochure training groups were respectively the most and the second most knowledgeable groups about this plan; while the untrained group did not have any knowledge of it. A study by Ebrahimi et al. (19) shows that citizens' awareness and practice regarding reducing waste production and in-house waste separation are not in a good condition. This conclusion is consistent with the untrained group's awareness and practice in this study. Ehrampoosh et al. (20) showed that the public's awareness of waste management was relatively good; nevertheless, people's practice was not satisfactory due to the lack of the necessary infrastructures for the plan's implementation on the part of the officials. The results of the question about the encouraging factors for participation in in-

house waste separation (question 7) revealed that among the three options mentioned for two training groups, the option of sufficient information was most widely selected. Also, in the essay section of this question in the workshop training group, responses such as sufficient information, interest in the environment and its beauty, financial encouragement, the sense of performing a good deed were written.

Regarding the statistics of the discouraging factors of in-house waste separation (question 7), the workshop training group referred to the time-consuming nature of the separation as the most discouraging factor among the three mentioned factors. In the essay section, they referred to the lack of space in apartments, the irregular collection of wastes, and the unfruitfulness of separation. The study of the brochure training group produced results similar to the workshop training group's, though they gave less complete answers in the essay section. In the untrained group, the majority left the question unanswered, due to the lack of knowledge.

The 9th question was about the motivational factors of in-house waste separation. According to the statistics, 81% of the workshop training group, 48% of the brochure training group, and 15% of the untrained group gave positive answers to this question. The bulk of the essay answers referred to issues such as encouraging people, assistance in having a healthier environment, and paying more for the costs.

The results of the 10th question show that the mean age in the workshop training group, in the brochure training group, and in the untrained group was 39, 36, and 34 years, respectively. Taking into account the voluntary participation of the members of the workshop training group in this course, and their higher inclination toward in-house waste separation, it can be concluded that the higher age group had more inclination for participation in waste separation than did the lower age group. The studies in Sweden (11,16) also confirm that among the external factors (such as income, position, and academic qualification), there is the highest correlation between people's age and their recycling behaviors. The results of the 11th-15th questions indicate that the level of academic training, profession, income, and the number of people in a household do not affect people's participation in in-house waste separation. These results prove similar to the results of the studies conducted in Sweden (11,16). However, the study by Ehrampoosh et al. (20) shows that there is a significant relationship between individuals' profession and level of academic qualification and their awareness in waste management.

This research shows that the people in district 5 of the Tehran Municipality (in particular, the workshop training group) had a positive attitude toward the environment and waste management system for creating recycling behavior. A study by Malakotiyan and Yaghmayian (21) approves of this conclusion, showing that the society is, to a significant degree, prepared to undergo the reformation and implementation of comprehensive urban waste management. Also, Ebrahimi et al. (19) confirm the fact that the regular and continuous implement of training programs in the field of waste management improved in-house waste separation in these districts. Therefore, having knowledge, which itself creates a positive attitude in individuals, is an important factor that paves the way for the emergence of recycling behavior. In this district, the two kinds of moral and commonsense responsibility had an important role in the emergence of recycling behavior, and most people referred, according to their own written statements, to citizens' moral responsibility for in-house waste separation. An important factor for motivating recycling behavior is to have knowledge about waste separation and its effects, which was sought by many people in the district. Many people considered more payments for the costs of the separated wastes, and giving prizes for the continuity of participation in in-house waste separation as very important factors for creating recycling behavior. The increase in the disposal costs of high-income families had very little effect on public participation

in in-house waste separation and recycling. In Sweden [11,16], the increase of waste disposal costs was effective only in the short-term, and indeed, it caused people's objection in Malt [16]. The convenience of the in-house separation, as well as, factors such as appropriate space, timely disposal and closeness to the containers are among the important factors mentioned in the questionnaires. Studies about motivational factors in every district based on its attitudes and cultural context, and then comparing it with other districts are recommended in order to identify the main and more important motivational factors to be implemented in all districts. Also, the way for increasing public participation in in-house urban waste separation should be paved by further continual publicizing through mass media.

Conclusion

The results of this study show that training, in particular workshop training, has a large impact on motivating and improving people's waste separation behaviors, such that many people after training stated that they are very much inclined to take part in the waste separation plan for different reasons such as protecting the environment. The effect of brochure training in attracting public participation was less than workshop training; though, motivation in this group was higher than that in the untrained group. Our findings confirm the fact that training is effective in changing beliefs and behaviors when responsible organizations provide necessary infrastructures continuously for realizing this objective.

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Contributions

Study design: ME, AK
Data collection and analysis: ARF, MHT
Manuscript preparation: AK

Conflict of interest

"The authors declare that they have no competing interests."

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