



## Survey of effective Parameters in People participation in Sorting the Waste (case study Tehran, IRAN, Region 1)

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### Abstract

*At present the solid waste of district 1 of Tehran with approximate daily weight of 2678 tons is collected by a contracting company equipped with 24 pickup trucks from door to door, also 17 prefabricated connex chambers have been placed in various locations in district, to receive the solid waste recyclable being delivered by the residents, the approximate daily weight of the solid waste is 103 tons. In this research the participation and cooperation of the district residences for separation and sorting of solid waste from outset have been assessed and their feedback concerning their training, their level of satisfaction on the position, volume and quality of the waste containers, the efficiency of mechanized collection, the information and the knowledge of residents about the implementation of the overall plan, its flaws and its advantages, have been fully studied. The results indicate that the degrees of citizens participation in separation and sorting of solid waste depend on their knowledge and awareness, the practical capabilities of the contraction, their satisfaction of mechanized collection, and the training rendered.*

**Keywords:** Participation, awareness, training, mechanized collection.

### Introduction

The state of our environment today is such that it needs all the help that we can give it. There are numerous ways to help the environmental. one of them is recycling of waste.

Recycling reduces pollution and preserve the environmental condition, save energy, preserve natural resources, save the space that is used for waste disposal, can help reduction of waste to go to the land fill and reduces emission of green house gases to atmosphere.

Waste sorting is first step and an important process in recycling and safe disposal of waste material.

In recent years, human being has changed the nature which is the base of his life by use of various technologies and has used it in order to satisfy his overgrowing needs. The human being without considering the major factors of environment and its tolerance limit has highly damaged the natural environment and has endangered the survival, growth and health of present and future generations. But if human being base his activities on logical framework and scientific and practical principles, he can possess a growing and dynamic social life<sup>1</sup>.

In field of previous studies we can mention<sup>2</sup> research entitled: as "project of surveying the residents about the performance of mechanized waste collecting system in Tehran city". In this research they analyzed the satisfaction level of residents based on age, gender, job and education in 1, 10 and 20 regions of Tehran city. The other research in this field is<sup>3</sup> paper entitled:

"awareness and importance of wastes sorting and preserving the natural environment" (case study on 22 regions of Tehran city). In this paper they analyzed the two variables of awareness and importance and its effect on sorting of waste and preserving the natural environment in 22 regions of Tehran city. The solid waste of district 1 of Tehran with approximate daily weight of 2678 tons is collected by a contracting company equipped with 24 pickup trucks from door to door. Also 17 recycling Conex have been placed in various locations in district, to receive the solid waste recyclable being delivered by the residents, the approximate daily weight of the solid waste is 103 tons.

**Table-1**  
**Represents the solid waste analysis of district 1, till 2012**

Bread		4/6%
Plastic		3/6%
Plaster		2/8%
Paper		8/3%
Paper	board	8/6%
Iron		1/7%
Non-iron	metals	1/1%
Cloth		0/6%
Glass		2/5%
Wood		0/4%
Rubber		0/1%
Special		1/1%
Others		0/6%
Solid waste total		%39
Valuable solid wastes		%35

There different methods for collecting the solid wastes in district 1 that we mention them below:

i. Waste pickers with an improper appearance which are sorting the solid wastes out of the residues and are passing in the district with a sack full of wastes. ii. Illegal agents who buy the solid wastes of residents (usually bread) from door to door with a cart and sometimes three-wheel motor cycle. Sometimes these transactions are in form of exchanging the solid wastes with plastic goods or salt and at the end of the day they receive their wage from the main operator. (figure-1)



**Figure-1**  
Illegal agents in district



**Figure-2**  
Illegal agents in district

iii. The traditional legal agents who are organized by municipality. They trade the solid waste from door to door by paying the monetary value of the wastes to the people and transferring them on carts with municipality logo, they are also equipped with municipality uniform, gloves, boots and big plastic bags. These agents are brokerage and receive their daily wage from the specific operators of municipality. iv. Pickups which have the municipality logo and "sorting from source plan" will go door to door and receive the solid wastes (every kind of solid wastes delivered by families) from families and give them lottery tickets in return. These agents are brokerage and receive their salary from related contractor (figure-2).

The procedure for implementing this plan is based on technical and administrative system booklet<sup>4</sup>.

**The research objectives:** The main objective of this research is analyzing the people's participation in "sorting from source plan" of region 1 and also analyzing the effect of 4 parameters of awareness, recognition, the proper implementation of commitments by administrators and satisfaction level of residents from mechanized system of waste collecting and also trainings, in this field.

**Research questions:** The research questions are divided into 6 groups (15 question) which are as below: Questions 1-3: about the understanding of people toward "sorting from source plan", solid and wet wastes and the way of their familiarization with this plan. Questions 4-6: about the way and amount of residents participation in collecting and transferring of solid wastes from the houses. Questions 7-9: about the contractor's commitment in collecting solid wastes and proper distribution of bags and recycling tickets. Questions 10-12: about the satisfaction level of residents toward mechanized collecting system, volume, type of material, and placement of storages. Questions 13-15: about the way of trainings in in "sorting from source plan", quantity and quality of training courses.

## Material and Methods

This research is done in three parts: studies, field operations and data analysis. The method of this research is survey, the type of studies are practical and data gathering techniques are questionnaire and open interview. The statistical population is consisted of people (man and woman) who are residents of region 1 of Tehran city. Sampling method is random, size of samples are 383 people and date of data gathering is May 2012. Regarding the geographical span, population and resident families of region, size of sample was estimated by use of Cochran Formula<sup>5</sup> and the result was 383 people then the same amount of questionnaire were randomly distributed between residents.

**Table-2**  
**The facilities and personnel of region 1 municipality**

region			1										
Area			1	2	3	4	5	6	7	8	9	10	جمع
Truck (with driver)								2					
Mechanized vehicle	(with driver)		1	1	1	1	1	1	1	1	1	1	10
Controlling patrol	Pickup	(with driver)	1	1	1	1	1	1	1	1	1	1	10
Transportation vehicles	with mentors		2	2	2	2	2	2	2	2	2	2	20
Recycling mentors			1	1	1	1	2	1	1	1	1	1	10
Booth atten			1	1	1	2	2	2	2	2	2	2	17
Controlling patrol	and supervision agents		5	5	5	5	5	5	5	5	5	5	50
The station guard								4					4
Sorting worker	of	recycling station						20					20
scale attendance								3					
Resident supervisor	of	recycling station						1					

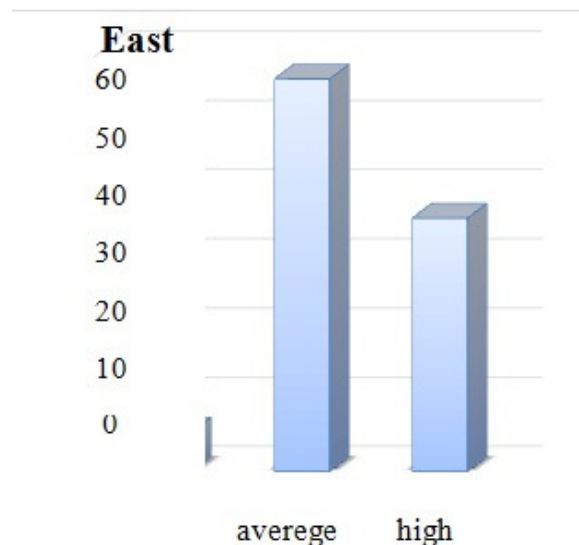
## Results and Discussion

Age: 119 people in range of 30-45 years old, 111 people in range of 18-30 years old, 98 people more than 45 years old and 48 people were under 18 years old.

**Table-3**  
**General traits of interviewed people in pilot area**

Gender		Age	
Male	198	-18	48
Female	195	18-30	111
Total	383	30-45	119
		+45	95
		Total	383

Gender: totally, 198 men and 185 women.

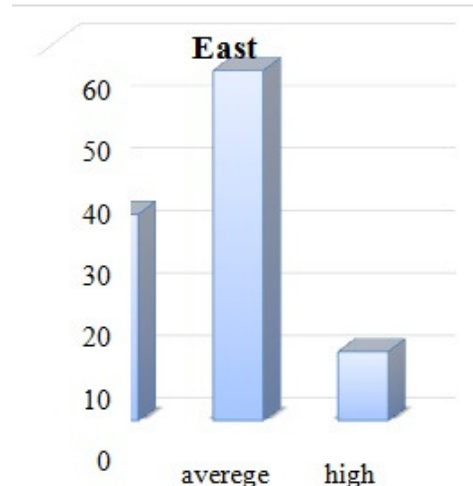


**Figure-1**

The amount of familiarity and awareness of residents

toward the in, sorting from source plan

The amount of familiarity and awareness of respondents toward the solid wastes and in “sorting from source plan” as it’s presented in figure No.1 is: 56.7% in average level, 36.6% in high level and 5.7% in low level. This familiarity and awareness is acquired through radio and TV (56.9%), newspapers (13.8%), recycling bureau agents (15.4%) and leaflets and placards (10.7%).

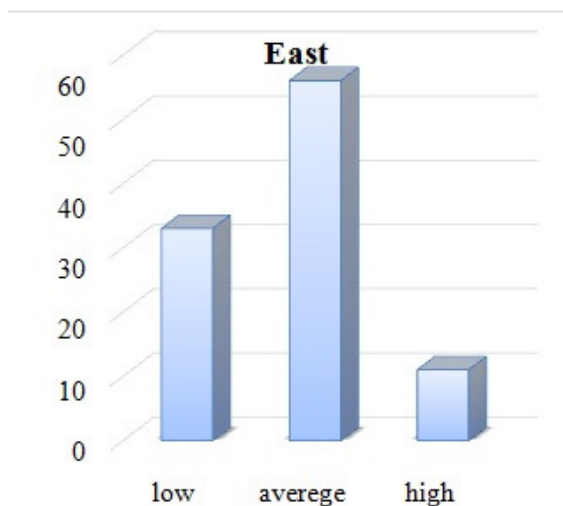


**Figure-2**

Amount of resident's participation in collecting and sorting of wastes

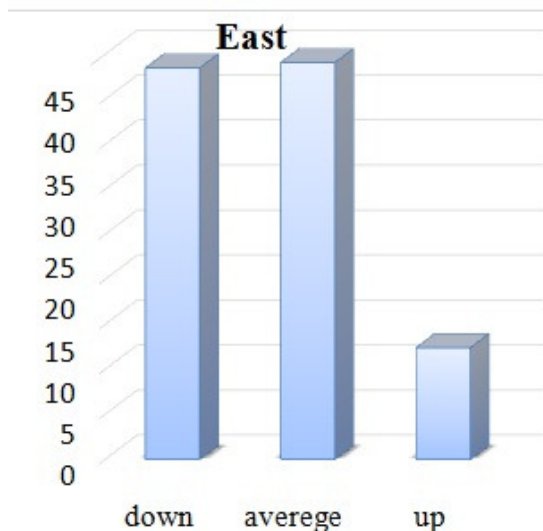
The amount of cooperation and participation of residents in “sorting from source plan” as it’s presented in figure No.2 is: 58.7% in average level, 29.2% in high level and 9.9% in low level. Among people who participate in “sorting from source plan” 82.1% declared that they sort all solid wastes, 7.1% declared that they only sort the bread (because of religious

beliefs), 4.8% declared that they only sort the paper and newspapers and 6% declared that they only sort the glass and rubber.



**Figure-3**  
Contractors and administrators commitment percentage toward, sorting from source plan

As its presented in figure-3, 45.2% of respondents has evaluated the proper implementation of contractors in average level, 35% in high level and 17.2% in low level. In case of question regarding the free distribution of blue bags which are designed specifically for collecting solid wastes and also receiving ticket, detergents and money in return of solid wastes, some of respondents declared they have no information which shows the activity of jobbers and opportunist people and more supervision is needed in this case.



**Figure-4**  
Satisfaction percentage of residents toward mechanized wastes collecting system and storages

As it's presented in figure-4, the satisfaction level of residents toward mechanized collecting system and storages is: 42% unsatisfied, 12% completely satisfied and 42.6% partly satisfied. In question regarding the storages material: 43.1% of respondents vote for plastic storages, 29.5 for metal storages and 26.1% for other materials (aluminum for its low weight, steel for its water resistance and wash ability and caoutchoucor for its wash ability and its stability to get different colors). The reasons of low satisfaction of residents toward mechanized wastes collecting system are: traffic jam in time of storages loading, noises, low quality of storages' material, inconsistency between storages volume and produced wastes in some regions, storages are not washed and long distance between storages and houses. Some reasons which result in satisfaction of residents are: the wastes are not accessible for mischievous animals and this prevents the spread of wastes in streets and will beautify the city, low weight, resistance against environmental conditions and the advantage of non-oxidize ability of plastic storages, coloring ability of metal storages, their resistance against impacts, fire and their durability and long life.



**Figure-5**  
Training percentage of residents in case of sorting from the source

As it's presented in figure No.5, 56.45% of respondents declared they had no training in case of sorting from the source and 41% declared they are trained. 51.6% of respondents were trained by public media, 19.1% by foundations, mosques and cultural centers, 15.9% by recycling bureau agents and 12.7% by schools. Regarding the residential texture of region 1, face to face training is not considered as a proper method. 71.5% of respondents consider the training content as simple and 23.8% as difficult and boring.

The relation between awareness and familiarity of people from "sorting from source plan" and their participation in collecting and sorting the solid wastes

**Table-4**

**Relation between familiarity and awareness of people with participation**

People's awareness and familiarity towards "sorting from source plan"		
0/128(*)	Pearson Correlation	Residents' participation in collecting and sorting of the solid wastes
0/013	Sig. (2-tailed)	

\* Correlation is significant at the 0.05 level (2-tailed)

Table No.4 presents the results of Pierson Test, regarding the amount of Pierson Test (0.128) and significance level (sig= 0.013) and with accepting the errors less than 0.05 and reliability degree of more than 0.95 we can say there is a significant relation between awareness and familiarity of people from "sorting from source plan" and their participation in collecting and sorting of the solid wastes.

The relation between the proper implementation of commitments by administrators and people's participation in collecting and sorting the solid wastes.

**Table-5**

**Relation between proper implementation of commitments and people's participation**

proper implementation of commitments by administrators		
0/107(*)	Pearson Correlation	people's participation in collecting and sorting the solid wastes
0/041	Sig. (2-tailed)	

\* Correlation is significant at the 0.05 level (2-tailed)

Table 5 presents the results of Pierson Test, regarding the amount of Pierson Test (0.107) and significance level (sig= 0.041) and with accepting the errors less than 0.05 and reliability degree of more than 0.95 we can say there is a significant relation between the proper implementation of commitments by administrators and people's participation in collecting and sorting the wastes. It means we don't accept and reject the null hypothesis (H0) which shows no relation. so we can say the proper and in time implementation of contractors' commitments has direct effect on participation level of residents.

The relation between the residents' satisfaction toward wastes collecting system and their participation in collecting and sorting the solid wastes

**Table-6**

**Relation between satisfaction level of residents and their participation**

residents' satisfaction toward wastes collecting system		
0/129(*)	Pearson Correlation	Residents' participation in collecting and sorting the wastes
0/014	Sig. (2-tailed)	

\* Correlation is significant at the 0.05 level (2-tailed)

Table-6 presents the results of Pierson Test, regarding the amount of Pierson Test (0.129) and significance level (sig= 0.014) and with accepting the errors less than 0.05 and reliability degree of more than 0.95 we can say there is a significant relation between the residents' satisfaction toward wastes collecting system and their participation in collecting and sorting the solid wastes. It means we don't accept and reject the null hypothesis (H0) which shows no relation. So we can say residents' satisfaction level toward wastes collecting system effects on their participation in collecting and sorting the solid wastes.

The relation between the training the sorting from the source and people's participation in collecting and sorting the solid wastes

**Table-7**

**Relation between training and people's participation**

Residents' participation in collecting and sorting the wastes	Have you ever been trained in case of sorting the wastes from the source?		
	yes	no	total
low	19 %12/1	19 %9/1	38 %10/4
average	77 %49	138 %66/3	215 %8/9
high	61 %38/9	51 %24/5	112 %30/7
total	157 %100	208 %100	365 %100

Chi-Square = 11/294, Sig = ,0/004 Cramer's V = 0/276 DF = 2

Based on results of table-7, amount of X2 Test is 11.294 and regarding the degree of freedom (df=2), and accepting the errors less than 0.01 (sig=0.004) and reliability degree more than 0.99 we can say there is a significant relation between the residents' training in case of sorting from the source and their participation



in collecting and sorting the wastes, It means we don't accept and reject the null hypothesis (H0) which shows no relation. It must be mentioned that regarding the calculated amount of Kramer test, the correlation intensity between two variables is in average level. So we can say the residents' training in case of sorting from the source directly effects on their participation and cultivation.

**Discussion:** In a research by Sarhadi & najafi<sup>2</sup> entitled as "project of surveying the residents about the performance of mechanized waste collecting system in Tehran city", the final results showed the 93% satisfaction of residents toward the implementation of mechanized waste collecting system, 77% of residents' cooperation in proper implementation of this system and 70-80% of municipality success in achieving its objectives in this plan. In another research by Darvish & Falahi<sup>3</sup> entitled as "awareness and importance of wastes sorting and preserving the natural environment" (case study on 22 regions of Tehran municipality), the results showed that regions 9,10 and 19 have less awareness toward the natural environment and regions 7,10 and 22 care the least about the natural environment.

Findings of this research as its presented in table 4 to 7 proves the previous hypothesis of this research about the significance of awareness and familiarity, proper implementation of commitments by contractors, satisfaction level of residents toward the mechanized collecting system and storages and also the relation between the training and participation and cooperation of residents. Public media has an important and effective role in training and familiarizing people with "sorting from source plan". Selection of contractors in this field has not been based on survey and evaluating their background, as a result, the performance of active contractors in implementing this plan is not satisfying and problems caused by their improper performance is covered by municipality personnel in regions. Before implementing the mechanized wastes collecting plan in region, more researches in field of variety of population and geographical condition of towns could be performed, for example, vehicles can hardly cross the narrow alleys, their dredging is not considered and placement of the storages is not based on each building and based on scientific method. The trainings in case of "sorting from source plan" are not sufficient and regarding the cultural and residential texture of region, face to face trainings is not considered as a proper method. Also some other residents declared that they are familiar with "sorting from source plan" through their travels to European and American countries and some other people are informed through websites.

## Conclusion

This point is very important that awareness and familiarity of people is not solely causing public participation and we can be ensured from implementation of wastes management law by simultaneous and synchronous use of "training and cultivating", "acting according to law", "using best technologies and updating them" in field of wastes management. Regarding

above mentioned points below suggestion are offered:

Placing placards and announcements in regions in order to inform residents about "sorting from source plan" which will cause better cooperation of people with trainers and recycling bureau agents and prevents the activity of illegal agents and jobbers.

Persuading and encouraging the private organizations, communities, city and rural councils, schools and universities, group programs of women, youths and interested people etc. to cooperate with local administrators, municipalities and natural environment bureau to attract the society's support for recycling the wastes through group and integrated activities.

Placement of solid wastes storages regarding the texture and amount of commercial, educational and residential places.

Reducing the intervals of manual collecting in regions and prevent the activity of illegal agents and waste pickers.

Including the educational content in textbooks about recycling or holding the extracurricular programs in schools.

Determining a day as "recycling day" as a symbolic movement in country. Establishing the recycle market and trading the recycle able products. Presenting the figures and statistics about the importance of wastes problem and recycling in order to create persuading motivations in society for more participation of people.

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