

ORIGINAL RESEARCH PAPER

Waste Management Pattern Regarding Sector Participation in District: A Case Study)

Behrouz Eskandarpour¹, Behnam Bagheri², Reza Alayi^{3,4*}, Fahimeh Asadi⁵

1. Assistant professor, Department of Business Management, Payame Noor University, Tehran, Iran
2. Assistant professor, Department of Geography, Payame Noor University, Tehran, Iran
3. Department of Mechanics, Germe Branch, Islamic Azad University, Germe, Iran
4. Energy Research Centre, Shahrekord Branch, Islamic Azad University, Shahrekord P.O. Box 88137-33395, Iran
5. M. A, Department of Business Management, Payame Noor University, Tehran, Iran Iran

ARTICLE INFORMATION

Received: 2023.01.29

Revised: 2023.02.23

Accepted: 2023.04.16

Published online: 2023.04.16

DOI: [10.22034/AP.2023.1978849.1145](https://doi.org/10.22034/AP.2023.1978849.1145)

KEYWORDS

Waste Management
Waste Separation
Economic Values
Legal Protection
Capacities
and Capabilities

ABSTRACT

Private sector participation in waste management has always been considered one of the most important issues in the municipality of District 14. The overall purpose of this study was to design a waste management model based on private sector participation in District 14 municipalities. The aim of this study was in the first fundamental stage and in the second stage of application in which the statistical population of this study in the first stage was 30 experts of the municipality of district 14 of Tehran who were selected in a purposeful way and in the second stage the statistical population of all municipalities' experts in district 14 of Tehran was 264 people of whom 169 people were randomly selected based on Cochran formula. Exploration in SPSS software identified 4 dimensions for these 36 indicators and using confirmatory factor analysis and second-order factor analysis, the validity of these indicators was confirmed using Cronbach's Alpha Test; the reliability of the researcher-made questionnaire was confirmed and finally, Friedman test results showed that legal protections had the priority and capacity. Abilities have the last priority in waste management based on private sector participation in District 14 municipalities.

How to Site: Eskandarpour B, Bagheri B, Alayi R, Asadi F, Waste Management Pattern Regarding Sector Participation in District: A Case Study, Anthropogenic Pollution Journal, Vol 6 (2), 2022: 98-108, DOI: [10.22034/AP.2023.1978849.1145](https://doi.org/10.22034/AP.2023.1978849.1145).

Corresponding author: reza.alayi@yahoo.com and Reza.Alayi@iau.ac.ir



This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

1. Background

Currently, about 58,000 tons of ordinary waste is produced daily in the country's cities and villages (Hemmati et al.,2019; Amirfazli et al.,2019). Annually, more than 21 million tons, of which about 75% are buried (5% of 75% of sanitary landfill and 70% of unsanitary burials and flips) (Ojaghi et al.,2021; Fataei & Seiiid Safavian,2017). The typical burial of this volume of produced wastes causes about 448,000 billion Rials of environmental damage annually due to land occupation for burial, contamination of groundwater caused by leachate penetration, greenhouse gas emissions, and non-reuse of recyclable resources, which is other than the cost of treatment due to various diseases in the health field (municipal organization and rural areas of the whole country)(Fataei et al., 2004; Fataei et al.,2006; Samadi Khadem et al.,2020). Today, protecting the environment and reducing the burden of pollution (water, soil, and air) in cities has become one of the most important human concerns (Fataei et al., 2011; Jalalzadeh et al., 2022).

In this regard, the growing energy consumption is one of the most important challenges of human growth, because on the one hand, the excessive consumption of various common energy resources from fossil fuels has put this God-given reserve at risk of destruction and on the other hand, pollution from consumption of these resources is a threat to the environment. On the other hand, population growth and urbanization development have led to many problems related to the degeneration of urban wastes (Fataei & Hashemimajd. 2012; Safavian et al.,2015). According to the existing statistics, the required space for burying each ton of waste has produced an average of 1.3 cubic meters, and 400 cubic meters of greenhouse gas and 200 liters of leachate are produced from each ton of waste (Seiiid Safavian et al., 2014; Fataei et al., 2023). Lack of space for landfill and also the problem of emissions such as greenhouse gases and leachates, creation of the non-normative burial center has motivated the search for principled methods with better planning and less environmental impacts for waste disposal (Aghbashlo et al., 2019; Alayi et al., 2020; 2016). Waste as one of the environmental problems is a well-known phenomenon in developed countries and how to manage the bulk of urban waste has been part of the job description of urban managers and authorities for years. Urban managers in their planning, on the one hand, look for culture for consumption patterns and thus reducing waste, and on the other hand, look for new methods and technologies in the field of refining management (Asnani et al.,2007; Fataee & Alesheikh, 2009). And waste processing is the least damaging to the environment (Seiiid Safavian and Fataei 2012; Shoary Bavi Oliaei & Fataei E,2016). Integrated waste management aims to manage the waste produced in a way that leads to sustainable development in the environment and economy and is acceptable to the community (Khalili Arjaqy & Fataei,2015; Mohammad Alipour et al., 2022). Evidence from other countries experience shows that public-private

participation in recycling programs increases recycling to waste ratio, reduces waste costs, and ultimately increases the quality and commercialization of recycled goods. In addition, the scope of private and public participation in waste management to the separation of hazardous waste components at the production site, lack of waste splurge in streets and streets, and observing the appropriate time for transferring waste to the outdoors can be expanded. Since people are the ultimate beneficiaries of the use of clean urban spaces, efficient public and private participation in urban waste recycling will also reduce public opposition and protests against municipal waste projects.

Increasing population and continuous expansion of cities on the one hand, and the increase and development of industrial, commercial, and service activities on the other hand, have led to the production of large quantities of waste materials in cities, which in most cases is management has caused many problems due to lack of facilities and budget. One of these problems is environmental pollution (Kharrat Sadeghi & Maleki, 2022). The experience of the world's major cities shows that designing a scientific and correct system can be effective in the management of waste materials. Solid waste management in different cities of Iran is faced with problems due to the cultural context, population, economy, consumption of waste materials, lack of responsibility of citizens, heterogeneous and widespread nature of waste materials, lack of implementation of regulations and laws, and lack of facilities in the field of urban services. To overcome many problems, it is necessary to take serious measures to optimize the various stages of waste management (production, on-site maintenance, collection, transportation), and in all stages of management is one of the keys to the success of public awareness and participation (Alayi & Rouhi, 2020a; 2020b).

People's lack of awareness of social obligations and urbanization, especially in health and environmental protection, and the misconception of more citizens about waste management as the fact that waste should be disposed of from the home environment in the individual dimension, causes the implementation of solid waste management programs to have little success (Taqwai et al., 2012). To achieve the development of participation culture, the participation rate of individuals in their activities and attitudes toward the impact of these activities on individual and collective life the other hand, appropriate contexts, facilities, and conditions and obstacles should be considered for achieving more because in Iranian society and now the necessity of voluntary participation is fully felt (Fahami et al., 2007). Nowadays, to achieve high levels of social participation and capacity building to strengthen effective awareness, separation of waste at source and recycling of waste are considered two important ways to improve the waste management system (Ali et al., 2010).

The importance of waste separation plan in Iran is very important because the components and compounds of waste can be recycled up to 60-70% or more. Also, about 20% of waste in Iran contains compounds such as

paper, cartons, plastics, glass, and recyclable materials that can be used well in the market that exists in Iran, provided that it is separated from its origin, after recycling and has significant benefits (Rafiee et al., 2013). On the one hand, problems such as the lack of incentives for waste producers to produce less or separate waste, the unprincipled accumulation of household waste, citizens' negligence about the health and environmental hazards of waste, especially hazardous wastes, and consequently the increase in contamination of surface and groundwater, soils and emissions of pollutants in the environment, and on the other hand, structural, administrative and legal problems of waste management that are inconsistent. Among responsible or effective organizations in waste management, it has led to the introduction of a new idea called integrated sustainable waste management in industrialized countries (Sadat Rahmati et al., 2013).

Since waste management has been organized seriously and somewhat based on scientific principles in recent years, it is necessary to conduct many basic and research studies in this field that can be done based on the results of necessary policies and future planning based on this information, so research in these areas will be very necessary. On the other hand, due to the high costs that must be spent on waste management, it is necessary to discuss private sector partnerships and ways to achieve it with new and scientific methods and techniques to reduce costs and improve the quality of waste-related activities. Therefore, in this research, we are looking for answers to the question of what the pattern of urban waste management is based on private sector participation in Tehran's 14th district municipality.

2. Materials and Methods

Since the current research has been conducted in two steps, it requires two research methods which are explained in the following. The research methodology in the first stage was a qualitative type of review of past research by the researcher, which was conducted using the Delphi method. The research methodology in the second stage was quantitative and conducted using the survey method. The kind of research in this stage was descriptive. It is descriptive because the purpose of research is objectively and accurately to describe a phenomenon and a survey. Then, a questionnaire was used to assess the perception and opinion of the elites of different organizations. Like the research methodology of social statistics, this research is conducted in two steps; in the first stage of statistical society are all of the municipal managers of the 14th district of Tehran and in the second stage, the statistical society of research is all of the municipal managers (264 people) of the 14th district of Tehran.

In this study, in the first stage, the statistical size for using the Delphi method was 30 municipal managers in the 14th district of Tehran and the sampling method was purposeful sampling.

In the second stage, the sample size was 169 using Cochran's formula. The sampling method in this research

was relative stratified random sampling. For the analysis of the first research question and in the first stage, the two-distance Delphi method was used. In the second stage, exploratory factor analysis was used in SPSS software to identify the dimensions of the waste management model based on private sector participation in the Tehran municipality. In addition, the confirmatory factor analysis method was used to evaluate the validity of the researcher-made questionnaire and Cronbach's alpha test was used to evaluate the reliability, and the Friedman test was used to prioritize the dimensions of waste management based on private sector participation in Tehran's 14th district municipality.

3. Results and Discussion

First stage: administration of the Delphi method

In this study, firstly the topic and its dimension were defined. According to the definition of the topic, the required specialties were determined and Delphi panel members were identified and selected in two stages using non-probabilistic sampling methods and questionnaires of each round were distributed and collected in person and absentia. Also, the Kendall coordination coefficient was used to determine the degree of consensus among panel members.

Idea generation stage

In this section, the statistical sample of the first stage was used to determine the gather influential indexes from interior and exterior studies, and ideal indexes was determined to manage waste based on the cooperation of the private section in the municipality of distinct 14 based on the self-inferences from the index model.

Item reduction stage

At this stage, the indices of medium and lower importance were removed based on the Kendall coordination coefficient table. Table 1 shows the obtained results from research conducted using the Kendall coordination coefficient table.

Therefore, according to the results of Table 1, the factors of medium were removed based on the table of Kendall coordination coefficient, and finally, 26 indicators were removed 62 indicators and 36 indicators remained in the analysis.

Second stage

In this stage of the study, 36 indexes were identified to investigate the dimensions of the indicators; the exploratory factor analytical method was used. The results of the exploratory factor research are given below.

Exploratory factor analysis

As mentioned in the review of literature, different evaluation tools including external variables were implemented to evaluate waste management based on the cooperation of the private section in the municipality of distinct 14.

Table 1. indicators with Kendell coordination coefficient

Raw	Indexes	Obtained Coefficient	Result
1	Separation of municipal solid waste	0.811	Strong consensus
2	Covering the surface of solid waste management services by collecting municipal solid waste door to door	0/832	Strong consensus
3	Credits and funding for waste management research	0.532	Medium consensus
4	Utilization of new technologies and appropriate technology and mechanization in waste management	0.411	Weak consensus
5	Increase efficiency in municipal solid waste	0.834	Strong consensus
6	Increase of recycled municipal solid waste	0.881	Strong consensus
7	Increase of scientific repulsion of municipal solid waste	0.832	Strong consensus
8	The mechanical condition of suitable places for municipal solid waste disposal	0/623	medium consensus
9	Efficiency in collecting municipal solid waste management	0.943	Very Strong consensus
10	Constant review along with re-engineering of services and products	0.443	weak consensus
11	The amount of employment created and the economic boom in the waste recycling and management cycle	0.633	Medium consensus
12	Processing of municipal solid waste	0.921	Very Strong consensus
13	Increase cost recovery for the local municipal entity in management services	0.866	Strong consensus
14	Control and direct private sector companies in the work process	0.823	Strong consensus
15	Codification of executive rules and instructions required to achieve the objectives of Article 12 of the executive regulations of the waste management law	0.420	Weak consensus
16	Launching a comprehensive waste management information system	0.519	Medium consensus
17	Government support from investment in novel technologies and appropriate technologies for recycling and management of waste	0/859	Strong consensus
18	Existence of suitable vehicles/ for the transportation of municipal solid waste	0.827	Strong consensus
19	Execution of limited bidding method in assigning work and inviting capable companies to implement waste	0.912	Very Strong consensus
20	Citizen's willingness to participate in waste management	0.622	medium consensus
21	Motivate, persuade, and encourage educated people to create needed service companies	0.803	Strong consensus
22	Protecting the interest of existing forces	0.930	Very Strong consensus
23	Providing the possibility of using the power and capacity of the private sector to participate in the implementation of waste management projects	0.852	Strong consensus
24	Religious and cultural values and beliefs	0.567	Medium consensus
25	Medium volume decrease (compression)	0.872	Strong consensus
26	Chemical volume decrease (burning)	0.876	Strong consensus
27	separation of waste components and drying and dewatering	0.882	Strong consensus
28	Considering the legal rights of workers in calculating wages and specifying contracts	0.834	Strong consensus
29	Establishment of strong, sound, and efficient monitoring systems	0.881	Strong consensus
30	Paying attention to the proper balance between supply and demand	0.474	weak consensus

Raw	Indexes	Obtained Coefficient	Result
31	Transfer of forces from the public sector while maintaining employment in the private sector	0.941	Very Strong consensus
32	Implementation of experts and experienced people	0.529	Medium consensus
33	Employing creative, well-thought-out, innovative human resources	0.643	Medium consensus
34	Increase financial strength by attracting new resources to the business	0.333	weak consensus
35	Attract investors to implement costly innovative and creative ideas	0.326	weak consensus
36	Full justification of influential forces and executives and building trust in them	0.860	Strong consensus
37	The broad view of the business environment and lack of limited and closed view	0.344	weak consensus
38	Adequate legal guarantee for the performance of duties	0.711	Strong consensus
39	Taking a closer look at the surroundings to identify new opportunities	0.519	Medium consensus
40	Increase the power of insight in identifying incorruptible opportunities	0.411	weak consensus
41	Increase in human being forces	0.827	Strong consensus
42	Citizens' tendency to cooperation behavior in waste management	0.612	Weak consensus
43	Transportation of waste in vehicles using closed cover	0.922	Very Strong consensus
44	Appropriate Design and locating of stores of municipal solid waste and consequently prohibiting trash distribution	0.814	Strong consensus
45	Satisfaction of citizens from the performance of the trustee institution	0.630	Medium consensus
46	Existence of waste processing facilities that are disposed of directly as a result of waste collection at landfills	0.852	Strong consensus
47	The degree of transparency of the law and the executive regulations of waste management	0.829	Strong consensus
48	Timely development of implementation rules, procedures, and instructions required in waste management	0.802	Strong consensus
49	Avoid blindly imitating and mere copying waste disposal methods	0.309	Weak consensus
50	Connection and interaction between capabilities and exclusive abilities of private section	0.411	Weak consensus
51	Citizen's satisfaction with the function of formal educational institutes	0.423	Weak consensus
52	Exclusive awareness about cooperation and its consequences	0.493	Weak consensus
53	Investment rate and services of the private section in industry, recycling technologies, and waste management section	0.678	Medium consensus
54	Administrating ideas in as short time as possible	0.396	Weak consensus
55	Enabling people in constant ideation	0.389	Weak consensus
56	Prepare and compile a specific price list for municipal service activities	0.876	Strong consensus
57	Existence of informing mechanism in private section cooperation	0.865	Strong consensus
58	Determination of correct items for empowerment and evaluation of private companies	0.843	Strong consensus
59	the rate of governmental support from interior investors and services of private sectors	0.834	Strong consensus
60	Developing required standards for equipment, machinery, and recycling products	0.892	Strong consensus
61	Increase of budgets at the level of urban institutions	0.820	Strong consensus
62	Having technical expertise	0.831	Strong consensus

Therefore, a collection of 36 items was conclusion and compiled in the section of the research questionnaire. Following that using SPSS software, exploratory factor analysis was conducted on all variables.

To confirm whether the collection of research data is appropriate for factor analysis or not, the adequacy of sampling should be tested. Hence, the KMO index or Bartlett index can be used. Does this test represent that the variance of the research variable is influenced by

the common variance of some hidden and fundamental factors or not? Sampling affirmative vote should be above 0.6 KMO or the Bartlett test should be significant. The results of this study are provided in Table 2. According to the results, exploratory factor analysis can be done. The value of the KMO index confirms the adequacy of sampling and a significant level less than the error level of 0.05 for the Bartlett test also indicates the appropriateness of the cited factor model.

Table 2. indicators with Kendell coordination coefficient

Kiser-Meyer-Alkin index (KMO)	0.817
Bartlett test	
Chi-square statistics	25638.635
Free degree	632
Significance level	0.0000

Table 3. Indicators with Kendell coordination coefficient

Index	Particular values		
	Total	Determined percent of the variance	Determined percent of the total variance
1	18.594	51.649	51.649
2	7.370	20.472	72.121
3	4.591	12.754	84.875
4	1.544	4.289	89.164
5	936	2.601	91.765
6	563	1.565	93.329
7	425	1.81	94.511
8	376	1.045	95.556
9	293	815	96.371
10	220	612	96.983
11	196	546	97.528
12	164	457	97.985
13	161	446	98.431
14	120	33	98.764
15	109	304	99.067
16	083	231	99.298
17	066	184	99.482
18	042	118	99.600
19	032	090	99.690
20	025	070	99.760
21	023	065	99.824
22	017	046	99.870
23	013	035	99.905
24	010	028	99.933
25	006	018	99.951
26	005	015	99.966
27	004	012	99.978
28	003	008	99.986
29	002	006	99.992
30	001	004	99.995
31	001	003	99.998
32	000	001	99.999
33	000	001	100.000
34	7.933E-5	000	100.000
35	8.269E-6	2.297E-5	100.000
36	8.574E-7	2.382 E-6	100.000

In the next stage, the number of hidden factors should be identified. Therefore, the results of the number determination of latent factors in terms of particular values are presented in Table 3. The column of particular values presents 4 factors with values above 1, so the suggested

factor structure will be 4, in which this factor 4 determines about 89.164 percent of variance change that is the proper value. The hidden factors were conclusion using main factors and Varimax rotation.

Table 4. Dimensions

	Waste separation	Economical values	Legal supports	Capacities and capabilities
	Fac1	Fac 2	Fac 3	Fac 4
S1	923	215	-010	086
S2	314	409	-019	805
S3	169	789	0182	321
S4	313	437	-040	809
S5	936	128	027	098
S6	970	084	032	152
S7	-033	151	871	048
S8	157	845	121	291
S9	011	146	933	054
S10	933	114	-.018	131
S11	968	077	029	145
S12	008	043	982	003
S13	008	022	989	005
S14	968	107	026	140
S15	939	83	031	148
S16	937	175	025	156
S17	854	255	-080	053
S18	959	146	020	148
S19	313	517	-071	746
S20	946	139	013	135
S21	957	092	021	15
S22	125	851	063	128
S23	153	876	104	204
S24	007	056	981	028
S25	132	870	023	086
S26	302	529	-0.69	744
S27	159	888	047	124
S28	958	170	-004	134
S29	071	794	-060	056
S30	168	897	069	158
S31	186	869	096	221
S32	950	148	003	125
S33	179	894	089	172
S34	956	160	012	118
S35	919	177	-039	106
S36	282	541	-095	682

Table 5. A factor analysis

Index name	Abbreviation	It is grateful if	Its rate in the obtained model	Result
The root of the mean squares of the estimation error	RMSEA	Smaller than 0.1	0.053	Approved
Kai Scorbe's Degree of freedom		Equal or smaller than 5	3.61	Approved
Fit goodness index	GFI	Greater than 0.8	0.93	Approved
Non-normalized fit index	NNFI	Greater than 0.8	0.91	Approved
Non-normalized fit index	NFI	Greater than 0.8	.92	Approved
Adaptive fit index	GFI	Greater than 0.8	0.92	Approved
Incremental fit index	IFI	Greater than 0.8	0.93	Approved

The rotated factor matrix was able to locate the variables in 4 factors. The results of this matrix were the base of grouping variables and based on some of the variables which have higher factor loads (greater than 0,7) are dedicated. Therefore, the identified factors were gathered based on 36 items and based on the concepts of items and theoretical literature included: waste separation, economic values, legal supports, capacities, and capabilities.

Confirmation factor analysis

To achieve a more precise factor structure, the confirmation factor analysis method was used. This method attempted to achieve a more precise and significant factor structure from the equation of questions and factors of first and second grades. In this kind of model, it is postulated that each of the hidden variables (factors) is the creator of more underlying factors or great factors.

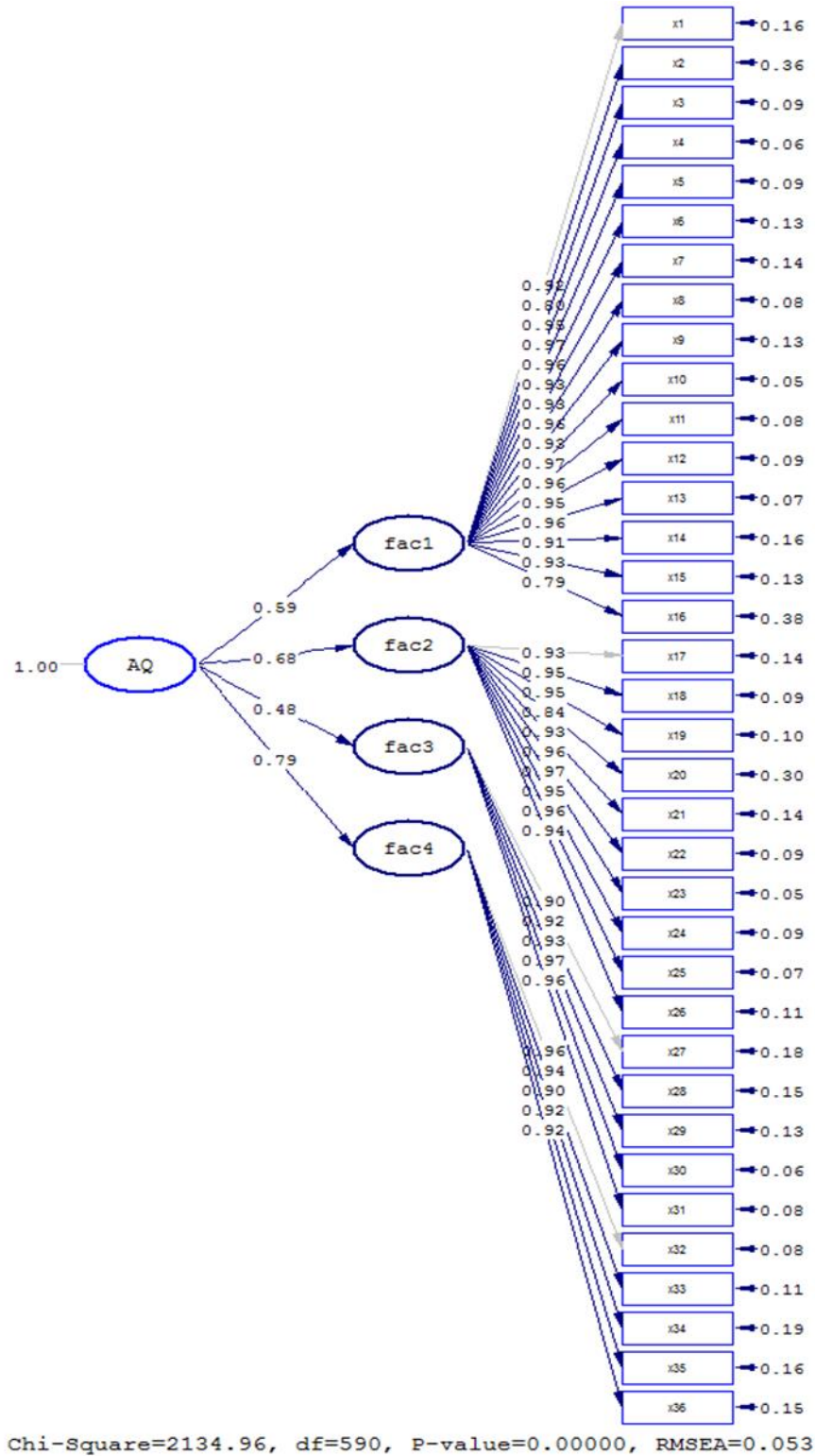


Figure 1. Factor loads of second-order analysis in standard state

In other words, factor analysis of second grade considering this concept do all the components (including waste separation, economical values, legal supports, capacities, and capabilities) fit into one concept or not?

In other words, the greater creator of inference factors in factor analysis is the first-grade type. As can be seen in Table 5, the values of the fit indices of the second-order model of waste management based on private sector participation in the municipality of District 14 indicated that all fit indices are acceptable and, like the first-order factor analysis, it can be said that the instrument is an acceptable construct validity and it is very popular among experts.

4. Conclusion

This study aimed to design a desirable model of waste management based on private sector participation in the municipality of District 14 in the participation of the private sector in the municipality of District 14 of Tehran. In this research, first, the subject and its dimensions were defined. Based on the definition of the subject, and the study of other researchers' theories about marketing and private sector participation according to the area under study, which was the municipality of District 14, 62 indicators were identified, according to the opinions of (Ohri & Singh, 2009; Tilly & Vandijek, 2013; Dorville, 2010; Kirama & Mayo, 2016; Bartone et al., 1991; Ismailis et al., 2018; Agh Bashloo et al., 2019; Gao et al., 2020) had been identified among 30 experts. The municipality of district 14 was distributed and finally, using Delphi's two-distance method, 26 indicators were removed from these 62 indicators with moderate and weak consensus based on (Schmidt et al., 2001) and finally 36 indicators remained.

In this stage, 36 indicators identified in the previous stage, which were identified by experts in two rounds, were used to determine the dimensions of these indicators using the exploratory factor analysis method to confirm whether the research data set is suitable for factor analysis and whether the sampling adequacy should be tested.

Kaiser-Meyer-Elkin index (KMO) or Bartlett's test can be used to do this. To confirm the adequacy of sampling, the KMO index must be above 0.6 or the Bartlett test is significant. The results of this test showed that the KMO index for this test is more than 0.6, so the sample size is suitable for factor analysis and Bartlett test results also showed the suitability of the cited operating model. In exploratory factor analysis, the column of specific values introduced 4 factors with a specific value higher than 1, so the proposed factor structure had 4 dimensions these four factors explained about 89.164% of the changes in variance.

The results of this matrix are based on grouping variables and accordingly, each factor assigns several variables with high operating loads (greater than 0.7). Accordingly, the identified factors have been developed based on 36 items and according to the concept of items and theoretical literature are: separation of waste with 16 items, economic values with 10 items, legal protections with 5 items, and capacities and capabilities or 5 items.

To achieve a more accurate factor structure, the factor analysis method was used. The purpose of this method is to achieve a more accurate and meaningful factor structure than the relationship between questions and factors of the first and second order. In such models, it is assumed that the hidden variables (factors) themselves are the construction of a more infrastructural factor or a larger factor. In other words, second-order factor analysis seeks to examine whether all components (waste separation, economic values, legal protections, and capacities and capabilities) fall into a concept.

The results showed that the values of fitness indicators of the second-order waste management measurement model based on private sector participation in the municipality of District 14 indicated that all fitness indicators are at an acceptable level and like the first-order factor analysis, it can be said that the tool has an acceptable and very good validity among experts.

This study was conducted in two qualitative and quantitative stages and among the two statistical populations that the statistical population in the first stage was 30 people who are directly involved with the participation of the private sector in the municipality of District 14 of Tehran, which were selected purposefully, and in the next step, 169 people from the municipality of district 14 of Tehran were randomly selected using Cochran formula. Finally, the pattern of waste management based on private sector participation in the municipality of District 14 is presented at the end of this section. Below are the results compared to previous research.

This result is consistent with the results of research by (Razghandi & Durrani, 2009; Kazemi et al., 2014; Talebi et al., 2014; Mandalizadeh et al., 2016; Najji & Khorasani, 2016; Ireland et al., 2003; Ireland & Webb, 2007; Kygido & Petrido, 2012).

The final model of waste management based on private sector participation in the municipality of District 14 was approved based on experts' opinions with 36 indicators.

Due to the newness of private sector activities in providing urban services, tolerance and avoidance of quick and authoritative encounters of public sector operators and guiding these companies to do the job properly will lead to the growth and strengthening of management in these companies and its fruit will be determined very soon and otherwise by eliminating service companies quickly, a company will never have enough opportunity to gain experience and deal with problems and won't fix them.

Determining the correct items for the rehabilitation and evaluation of service companies before referring the work to them: In this section, priority items such as managerial ability and work experience, education and expertise with more weight, and things such as facilities, machinery, capital, etc. Also, be taken into account. Based on this capability, different companies are graded and can be assigned to them based on this rating. Implementation of limited tender method in the assignment of work and inviting capable companies to execute the work: Based on the power measurement done with the correct items,

companies are allowed to enter the field of activity in urban services according to their power and by replacing the limited tender method instead of free tender, the entry of weak companies, which, certainly with an unrealistic view, sometimes through lower prices, provide poor work. Of course, in holding tenders, emphasizing that always lower price is not the best option; paying attention to the quality of services and the power of the bidder will be more logical.

It should be noted that to strengthen start-up companies, their power should be considered in defining their work and smaller areas should be defined for them.

Timely payment of corporate demands: Certainly, creating mutual trust between employers and the private sector, especially in the field of payments and demands, will be one of the necessities of the proper functioning of the system, creating the mentality that the employer considers the service provider as part of himself and the problems of the company, the problems of the employer will be directly involved in preventing the reduction of the quality of services, and in addition, it should be noted that new companies. The educated forces do not have a strong financial salary and cannot pay the salaries and benefits of the personnel and the costs of the company for several months.

Considering the legal rights of workers in calculating wages and stipulating in contracts: To avoid problems caused by non-payment of workers' legal rights by companies, it should be considered in calculating the wages of all relevant salaries,

References

- Aghbashlo, M., Tabatabaei, M., Soltanian, S., Ghanavati, H., & Dadak, A. (2019). Comprehensive exergoeconomic analysis of a municipal solid waste digestion plant equipped with a biogas genset. *Waste management*, 87, 485-498.
- Alayi, R., Sobhani, E., & Najafi, A. (2020). Analysis of environmental impacts on the characteristics of gas released from biomass. *Anthropogenic Pollution*, 4(1), 1-14.
- Alayi, R., Shamel, A., Kasaian, A., Harasii, H., & Topclar, M. A. (2016). The role of biogas to sustainable development (aspects environmental, security and economic). *Journal of Chemical and Pharmaceutical Research*, 8(4), 112-118.
- Alayi, R., & Rouhi, H. (2020). Techno-economic analysis of electrical energy generation from urban waste in Hamadan, Iran. *International Journal of Design and Nature and Ecodynamics*, 15(3), 337-341.
- Alayi, R., Jahangeri, M., & Monfared, H. (2020). Optimal location of electrical generation from urban solid waste for biomass power plants. *Anthropogenic Pollution Journal*, 4(2), 44-51.
- Ali, A. A., Gumbe, L. O., Mohammed, A. H., & Nathan, N. (2010). Nairobi solid waste management practices: Need for improved public participation and involvement. *Tanzania Journal of Forestry and Nature Conservation*, 80(1), 61-73.
- Amirfazli M, Safarzadeh S, Samadi Khadem R. Identification, Classification and Management of Industrial Hazardous Waste in Ardabil Province. *Anthropogenic Pollution*. 2019; 3(2): 29-36.
- Asnani, P. U., & Zurbrugg, C. (2007). Improving municipal solid waste management in India: A sourcebook for policymakers and practitioners. World Bank Publications.
- Bartone, C. R., Leite, L., Triche, T., & Schertenleib, R. (1991). Private sector participation in municipal solid waste service: experiences in Latin America. *Waste Management & Research*, 9(6), 495-509.
- Chang, w.c& et al ,2000, Waste home appliances recycling and resource recovery in Taiwan , "in: Proceedings of ENERGEX, 2000 the8 international Energy Forum, Reno, Nevada.
- Daniel, H., & Perinaz, B. T. (2012). What a waste: a global review of solid waste management. World Bank.
- Dorvil Patrick Louigueur. (2010). Private Sector Participation in Solid Waste Management: Business Opportunities and economic Limitations Paperback. Suedwestdeutscher Verlag fuer Hochschulschriften (February 9, 2010)
- Fataei, SM Monavari, SM Shariat, A Javanshir, HA Leghaei (2004) Solid Waste Disposal Management in Semi-Arid Regions (Case Study: City Sar-ein Sight)(In Persian), *Desert (BIABAN)* 9 (1), 81-91.
- Fataei, E., Monavari, S. M., Shariat, S. M., Laghaei, H. A. & Ojaghi, A. 2006. Management of collection, transportation and landfilling of solid waste in Sarein City. *Journal of Solid Waste Technology and Management*, 31, 224-229.
- Fataee E, Alesheikh A. (2009) Housing site selection of landfills for urban solid wastes using GIS technology and analytical hierarchy process (A Case Study in the City of Givi) *Environmental Sciences(In Persian)*, 6 (3):33-42.
- Fataei E, Hashemi Majd K, Zakeri F, Akbari Jeddi E, (2011) An experimental study of vermicomposting with earthworm (*Eisenia foetida*) growth in edible mushrooms wastes, *International Journal of Bio-resource and Stress Management*, 2 (1), 66-68.
- Fataei, E. & Hashemimajd, K. 2012. Assessment of chemical quality and manure value of vermicompost prepared from mushroom wastes. *Asian Journal of Chemistry*, 24, 1051-1054.
- Fataei E, Seieed Safavian ST. Comparative study on efficiency of ANP and PROMETHEE methods in locating MSW landfill sites. *Anthropogenic Pollution*. 2017; 1(1): 40-5.
- Fataei E, Samadi Khadem R, Ojaghi Aghchehkandi A, (2023) Determining the optimal urban waste management strategy using SWOT analysis: A case study in MeshginShahr, Iran, *Journal of Advances in Environmental Health Research* 10 (4).
- Metin, E., Eröztürk, A., & Neyim, C. (2003). Solid waste management practices and review of recovery and recycling operations in Turkey. *Waste management*, 23(5), 425-432.]
- Esmailian, B., Wang, B., Lewis, K., Duarte, F., Ratti, C., & Behdad, S. (2018). The future of waste management in smart and sustainable cities: A review and concept paper. *Waste management*, 81, 177-195.]
- Guo, X. X., Liu, H. T., & Zhang, J. (2020). The role of biochar in organic waste composting and soil improvement: a review. *Waste Management*, 102, 884-899.
- Jalalzadeh A, Rabieifar HR, Vosoughifar H, Razmkhah A, Fataei E (2022) Investigation of daily waste load allocation in Zarrineh-rud river for environmental management of cold-water fish species, *Anthropogenic Pollution* 6 (1), 36-46.
- Kanat, G. (2010). Municipal solid-waste management in Istanbul. *Waste management*, 30(8-9), 1737-1745.
- Hedjazi, Y., Arabi, F. (2009). Factors Influencing Non Government Organizations' Participation in Environmental Conservation. *International Journal of Environmental Research*, 3(1), 129-136.
- Hemmati, S., Fataei, E. & Imani, A. A. 2019. Effects of source separation education on solid waste reduction in developing countries (a case study: Ardabil, Iran). *Journal of Solid Waste Technology and Management*, 45, 267-272.
- Khalili Arjaqy Sh, Fataei E(2015) Assessment of Waste Management in Health Centers in the city of Ardabil, *Biological Forum* 7 (2), 117.
- Kharrat Sadeghi, M., & Maleki, A. (2022). The effect of source separation training on municipal waste reduction: A case study. *Anthropogenic Pollution*, 6(2), 10-15. doi: 10.22034/ap.2022.1966027.1135

- Kirama, A., & Mayo, A. W. (2016). Challenges and prospects of private sector participation in solid waste management in Dar es Salaam City, Tanzania. *Habitat International*, 53, 195-205.
- Lee, S., & Paik, H. S. (2011). Korean household waste management and recycling behavior. *Building and Environment*, 46(5), 1159-1166.
- Lu, L. T., Hsiao, T. Y., Shang, N. C., Yu, Y. H., & Ma, H. W. (2006). MSW management for waste minimization in Taiwan: The last two decades. *Waste Management*, 26(6), 661-667.
- Mohammad Alipour, S., Fataei, E., Nasehi, F., & Imani, A. A. (2022). Vermicompost quality and earthworm reproduction in different organic waste substrates. *International Journal of Recycling Organic Waste in Agriculture*, (), -. doi: 10.30486/ijrowa.2022.1944906.1371
- Ohri, A., & Singh, P. K. (2009). Private Sector Participation in Municipal Solid Waste Management in India: Observation and Options. *Proceedings of RAWM*, 141.
- Ojaghi, A., Fataei, E., Garibi Asl, S. & Imani, A. A. 2021. Construction, design and testing of infectious waste decontamination device by mechanical and chemical methods, Imam Khomeini Hospital, Sarab, Iran: A case study. *Journal of Health Sciences and Surveillance System*, 9, 184-190.
- Otitaju, T. A. (2014). Individual attitude toward recycling of municipal solid waste in Lagos, Nigeria. *American Journal of Engineering Research*, 3(7), 78-88.
- Portney, K. (2005). Civic engagement and sustainable cities in the United States. *Public Administration Review*, 65(5), 579-591.
- Samadi Khadem R, Fataei E, Joharchi P, Ramezani ME, (2020) Site selection of hazardous waste landfill: A case study of Qazvin Province, *Journal of Health(In Persian)*, 11 (3), 281-298
- Seiied safavian ST, Fataei E(2012) Designing Storage, Collection and Transportation System of Municipal Waste, *Int. Proc. Chem., Biol. Environ. Eng* 42, 40-45
- Seiied Safavian ST, Fataei E, Hassanpour H, Tolou I (2014) Automatic Recycling Waste Receive System in Public Areas., *Advances in Bioresearch* 5 (1).
- Seiied Safavian ST, Fataei E, Ebadi T, Mohamadian A.(2015) Site Selection of Sarein's Municipal Solid Waste Landfill Using the GIS Technique and SAW Method, *International Journal of Environmental Science and Development* 6 (12), 934-341.
- Shoary Babil Oliaei A, Fataei E,(2016) Breakdown of urban waste repository location using GIS (Case study District 3 region 1 Tabriz), *Ecology, Environment and Conservation*, 22, 551-557.
- Tilaye, M., & Van Dijk, M. P. (2014). Private sector participation in solid waste collection in Addis Ababa (Ethiopia) by involving micro-enterprises. *Waste Management & Research*, 32(1), 79-87.
- Turan, N. G., Çoruh, S., Akdemir, A., & Ergun, O. N. (2009). Municipal solid waste management strategies in Turkey. *Waste Management*, 29(1), 465-469.
- United Nations Human Settlements Programme. (2010). *Solid Waste Management in the World's Cities: Water and Sanitation in the World's Cities 2010*. Earthscan.
- Van Speier, J. (2009). Citizen participation influencing public decision making: Brazil and the United States, 6(1): 156-159.
- Zhang, D., Huang, G., Yin, X., & Gong, Q. (2015). Residents' waste separation behaviors at the source: Using SEM with the theory of planned behavior in Guangzhou, China. *International journal of environmental research and public health*, 12(8), 9475-9491