Fuzzy Clustering Approach for Marketing Recycled Products of Tabriz Municipality Waste Management Organization

Vahid Saeid Nahaei[1] , Farzad Naziri-Oskuei[2]

[1,2] *Center Municipality Building, Tabriz Municipality, Tabriz, Iran*

A R T I C L E I N F O	A B S T R A C T
	The main concern of municipalities is the realization of sustainable revenues. Organizations affiliated with municipalities should play a role in generating revenue by defining specialized tasks while assisting municipal tasks. Tabriz Municipality Waste Management Organization seeks to achieve this by defining its strategies and goals. The organization has implemented various projects to generate revenue from recycled products. Poor planning and failure to fully outsource are among the obstacles of this organization. Therefore, marketing of recycled products is an important project. Lack of careful planning in this regard, marketing costs and weakness of private sector investment projects are the most important obstacles facing the organization. This article has determined the degree of homogeneity of waste organization projects in the marketing of recycled products with a fuzzy clustering approach and according to the opinions of experts. The results show that some of the organization's projects lack value. Instead, some projects, such as the construction of a recycling town with a variety of recycled products, renewable energy recycling, and plastic recycling with a variety of products, have similar features in the product mix marketing element, and this can reduce marketing costs and Focus on such projects.

1. Introduction

The COVID-19 crisis has affected many issues in the world, including marketing. The COVID-19 crisis is affecting consumer behavior and thus the way in which marketing can be used. The use of marketing during (and after) the COVID-19 crisis shows (and will continue to show) similarities with the way that marketing is carried out during economic downturns (He, & Harris, 2020). In this context, urban management must seek innovative solutions in all areas from tourism to service to citizens (Parviznejad, & Akhavan, 2021). The stable periods of the economy are more suitable for the implementation of marketing mix elements. In such periods, as the financial situations of consumers are stable, it is relatively easier to make marketing decisions (Sigindi, 2018). Municipalities face the challenge to grow – with the "right" mix of businesses, services, and infrastructure to support the needs and wants of all stakeholders. Sales is one of the most important topics in marketing. For services firms in the market, regardless of the ownership issue of prices is very important. A community's strategic growth is the product of short and long term goals. Municipalities that naim to grow and differentiate from neighboring communities must understand their audience and craft a message that is unique and positions them for strategic growth. Marketing segmentation is key for municipalities to share the right message with the right people at the right time through the right channels (Akcay, & Okkay, 2017). Historically, municipalities have focused on investing in economical development for the region rather than marketing designated to attract people to the municipality. Several researchers have pointed out the importance of the politicians being able to provide statistical evidence that the cost for marketing the place will be surpassed by the economical gains from new businesses, new residents or tourists attracted to the place (Lundmark, 2006). The issue of waste management (waste management, collection management, transportation, processing, recycling or disposal of waste) is very important in terms of environmental, cultural and economic issues and is considered by researchers and capital in various aspects (Sengupta, & Agrahari, 2017). The global waste management market size was valued at $1,612.0 billion in 2020, and is expected to reach $2,483.0 billion by 2030, registering a CAGR of 3.4% from 2021 to 2030. Waste management is the collection, transportation and disposable of garbage, sewage, and other waste products. It involves treating solid waste and disposing unwanted products and substances in a safe and efficient manner. Waste management includes all types of waste including solid, liquid, or gas. Waste management deals with municipal, industrial, and hazardous waste. Municipal waste generally refers to residential waste and non-hazardous waste generated in towns and cities. Industrial waste refers to waste generated in industries while production and manufacturing processes. Hazardous waste refers to waste generated in pharmaceuticals, medicals, chemicals, and paint manufacturing industries. However, high cost of procuring and operating waste management solutions is expected to hamper the market growth. In addition, waste management is labor intensive and can consume a lot of amount as their wages. Similarly, costs of transportation of waste can take up a lot of allocated amount as the cost includes collection cost and further transportation to landfills or recycling facilities. Cost recovery for waste services differ largely from income levels. Thus, making the waste management market a little rigid, considering the investments related to its process, which, in turn, hampers the market growth (Alliedmarketresearch, 2021).

Theories related to fuzzy sets are important approaches in urban management projects (Youssefi, et al., 2011). Investigating the uncertainty in the components of urban management is one of the factors that can lead to the development of sustainable incomes (Parviznejad, & Bahrami, 2021). Due to the uncertainty in the data related to municipal waste and the diversity of recycled products in municipal waste management, the fuzzy clustering method developed has been used for this research. Considering

the fields of sales and export of recycled products of Tabriz Municipal Waste Management Organization, fuzzy clustering of these products has been determined according to the sales priorities and a marketing mix approach has been considered for these clusters.

2. Literature Review

Today's businesses, especially in Iran, face many factors and challenges, one of which is uncertainty in inputs and laws and regulations. Especially in the current situation and with the development of e-commerce on the one hand and on the other hand despite critical conditions such as COVID-19, the purpose of a paper is a comparison between businesses with the study of hypermarkets and net markets. This research is a descriptive-analytical type that after explaining the goals and components of organizational business using library resources and Internet search, interviews and questionnaires, from a multi-criteria decision approach and fuzzy logic for effective analysis. The implications of organizational business are exploited. Two areas of physical retail businesses such as hypermarkets and virtual ones such as net markets have been compared and analyzed. The result of the research has been that due to the capabilities of the development of net markets such as the effective use of information technology and experts, their comprehensive development and growth in the future is more realistic that the ability to extend this to other areas of virtual business. Especially in spite of critical conditions such as the spread of pandemics, the popularity of using net markets has increased (Nahaei, & Bahrami, 2021). In any study of market segmentation, researchers often use clustering analysis as a tool. The analysis often is in a crisp partition form. But in practice, the sample are usually not well distributed, therefore the form may not be precisely defined. That is, one sample can belong to two or more groups. But, due to the fact that the requirements on the consumers and on the market are very high and the many real-market problems are fuzzy by nature and not random, the probability applications have not been very satisfactory in a lot of case. In a study, the authors adopt the fuzzy cluster method and attempt to combine a new compactness and separation validity function to build market segmentation in order to address the fuzziness among the group boundaries. Then they could use membership grade to describe each group. Therefore, the real market situation is clearly presented. Through membership grade, they depict the reality of the market, which lies between integers and real number. Buyers' mindsets are both rational and complicated, so their purchasing decisions are not predictable and are affected by many factors. The structural stability of the market can be tested by the loyalty of buyers who pertain to different clusters. Marketing strategies will also have effects on the movement of group for housing buyer (Hsu, et al., 2000). Segmentation has several strategic and tactical implications in marketing products and services. Despite hard clustering methods having several weaknesses, they remain widely applied in marketing studies. Alternative segmentation methods such as fuzzy methods are rarely used to understand consumer behaviour. In another study, the authors propose a strategy of analysis, by combining the Bagged Clustering (BC) method and the fuzzy *C*-means clustering method for fuzzy data (FCM-FD), i.e., the Bagged fuzzy *C*-means clustering method for fuzzy data (BFCM-FD). The method inherits the advantages of stability and reproducibility from BC and the flexibility from FCM-FD. The method is applied on a sample of 328 Chinese consumers revealing the existence of four segments (Admirers, Enthusiasts, Moderates, and Apathetics) of the perceived images of Western Europe as a tourist destination. The results highlight the heterogeneity in Chinese consumers' place preferences and implications for place marketing are offered (D'Urso, et al., 2015). It has long been argued that the housing market is spatially subdivided within an urban area. The argument has important implications for explaining how the housing market works and describing the distinctiveness of each housing submarkets, having determined, a priori, its segmentation. The most commonly used method for

identifying housing submarkets is based on cluster analysis, although hedonic analysis has been extensively used. The hedonic analysis is used to derive dimensionality of the housing market by estimating what attributes are significant factors influencing housing price. Those attributes or variables can then be used for cluster analysis. A paper proposes an analysis of the real estate market in San Cristoforo, Catania, trying to integrate two different clustering analysis approaches to defining its possible submarkets articulation. The first one is a hard clustering approach using the K-means method and hypothesizing different numbers of clusters. The second one can be considered a verification of the previous results: a fuzzy algorithm is applied to obtain the fuzzy set membership degree of each data point to housing submarkets defined within the examined urban area. The comparison between the results coming from the two different approaches suggests some reflections about the use of these powerful techniques for integrating the knowledge of the complex and multi-layered real estate markets in the urban recovery policies (Gabrielli, et al., 2017). The purpose of a paper is to propose a data mining approach for mining valuable markets for online customer relationship management (CRM) marketing strategy. The industry of coffee shops in Taiwan is employed as an empirical case study in this research. Via a proposed data mining approach, the study used fuzzy clustering algorithm and Apriori algorithm to analyze customers for obtaining more marketing and purchasing knowledge of online CRM systems. The research found three hard markets and one fuzzy market. Furthermore, the study discovered two association rules and two fuzzy association rules (Chiang, 2018). Another study evaluates the performance of different data clustering approaches for searching the profitable consumer segments in the UK hospitality industry. This paper focuses on three aspects of datasets including the ordinal nature of data, high dimensionality and outliers. Data collected from 513 sample points are analysed in this paper using four clustering approaches: Hierarchical clustering, K-Medoids, fuzzy clustering, and Self-Organising Maps (SOM). The findings suggest that Fuzzy and SOM based clustering techniques are comparatively more efficient than traditional approaches in revealing the hidden structure in the data set. The segments derived from SOM has more capability to provide interesting insights for data-driven decision making in practice. This study makes a significant contribution to literature by comparing different clustering approaches and addressing misconceptions of using these for market segmentation to support data-driven decision making in business practices (Arunachalam, & Kumar, 2018).

A paper analyses the voice of customers (VoCs) using a hybrid clustering multi-criteria decision-making (MCDM) approach. The proposed method serves as an efficient tool for how to approach multiple decision-making involving a large set of countrywide customer complaints in the Iranian automotive sector. The countrywide data comprising 3,342 customer complaints (VoCs) were gathered. A total of seven determinant complaint criteria were identified in brainstorming sessions with three groups (six each) of experts employing the fuzzy Delphi method. The weights of these criteria were assigned by applying the fuzzy best–worst method (FBWM) to identify the severity of the complaints. Subsequently, the complaints were clustered into five categories with respective customer locations (province), car type and manufacturer using the *K*-mean method and further prioritised and ranked employing the fuzzy complex proportional assessment of alternatives (FCOPRAS) method. The results indicated that the majority of complaints (1,027) from the various regions of the country belonged to one specific model of car made by a particular producer. The analyses revealed that only a few complaints were related to product quality, with the majority related to service and financial processes including delays in automobile delivery, delays in calculating monthly instalments, price variation, failure to provide a registration (licence) and failure to supply the agreed product. The proposed method is an efficient way to solve large-scale multidimensional problems and provide a robust and reliable set of results (Mahdiraji, et al., 2020). The increasing interest in fuzzy-set Qualitative Comparative Analysis (fsQCA)

in Information Systems and marketing raises the need for a tutorial paper that discusses the basic concepts and principles of the method, provide answers to typical questions that editors, reviewers, and authors would have when dealing with a new tool of analysis, and practically guide researchers on how to employ fsQCA. This article helps the reader to gain richer information from their data and understand the importance of avoiding shallow information-from-data reporting. To this end, it proposes a different research paradigm that includes asymmetric, configurational-focused case-outcome theory construction and somewhat precise outcome testing. This article offers a detailed step-by-step guide on how to employ fsQCA by using as an example an already published study. We analyze the same dataset and present all the details in each step of the analysis to guide the reader onto how to employ fsQCA. The article discusses differences between fsQCA and variance-based approaches and compares fsQCA with those from structured equation modelling. Finally, the article offers a summary of thresholds and guidelines for practice, along with a discussion on how existing papers that employ variance-based methods are extendable and complemented through fsQCA (Pappas, & Woodside, 2021). The population in Sweden is growing rapidly due to immigration. In this light, the issue of infrastructure upgrades to provide telecommunication services is of importance. New antennas can be installed at hot spots of user demand, which will require an investment, and/or the clientele expansion can be carried out in a planned manner to promote the exploitation of the infrastructure in the less loaded geographical zones. In this paper, the authors explore the second alternative. Informally speaking, the term Infrastructure-Stressing describes a user who stays in the zones of high demand, which are prone to produce service failures, if further loaded. They have studied the Infrastructure-Stressing population in the light of their correlation with geo-demographic segments. This is motivated by the fact that specific geo-demographic segments can be targeted via marketing campaigns. Fuzzy logic is applied to create an interface between big data, numeric methods for its processing, and a manager who wants a comprehensible summary (Podapati, et al., 2017). In else paper, the writers investigate the multiple attribute decision making problems with picture fuzzy information. Then, they utilize induced OWA (IOWA) operator to develop picture fuzzy induced OWA (PFIOWA) operators. The prominent characteristic of this proposed operator are studied. Then, they have utilized the PFIOWA to develop an approach to solve the picture fuzzy multiple attribute decision making problems. Finally, a practical example for evaluating the enterprise marketing capability is given to verify the developed approach and to demonstrate its practicality and effectiveness (Li, et al., 2017). Nowadays, a huge amount of data is generated due to rapid Information and Communication Technology development. In a paper, a digital banking strategy has been suggested applying these big data for Iranian banking industry. This strategy would guide Iranian banks to analyse and distinguish customers' needs to offer services proportionate to their manner. In this research, the balances of more than 2,600,000 accounts over 400 weeks are computed in a bank. These accounts are clustered based on justified RFM parameters containing maximum balances, the most number of maximum balances and the last week number with the maximum balance using k-means method. Subsequently, the clusters are prioritised employing Best Worst Method- COmplex PRoportional ASsessment methods considering the diverse inner value of each cluster. The accounts are classified into six clusters. The experts named the clusters as special, loyal, silver- high interaction, silverlow interaction, bronze, averted- low interaction. Silver-low interaction cluster and loyal cluster are picked in order by experts and BWM-COPRAS as the most influential clusters and the digital banking strategy is developed for them. RFM parameters are modelled for customers' accounts singly. The aggregation of the separate accounts of a customer should be considered (Mahdiraji, et al., 2019). Today all business organizations are adopting data driven strategies to generate more revenue out of their business. Growing startups are investing a lot of money in data economy to maximize profits of business organizations by developing intelligent tools backed by machine learning and artificial intelligence. The nature of BI tool depends on factor like business goals,

size, model, technology etc. In a paper architecture of business intelligence tool and decision process has been discussed with a focus on market segmentation, based on user behavior analysis using k-mode clustering algorithm and user geographical distributions. The proposed toolkit also incorporates interactive visualizations and maps (Kamthania, et al., 2018). Data mining and big data analytic techniques are playing an important role in many application fields, including the financial markets. However, only few studies have focused on predicting daily stock market returns, and among these studies, the data mining procedures utilized are either incomplete or inefficient. A paper presents a comprehensive data mining process to forecast the daily direction of the S&P 500 Index ETF (SPY) return based on 60 financial and economical features. The fuzzy c-means method (FCM) is initially used to cluster the preprocessed data. A principal component analysis (PCA) is applied next to the entire data set and each of seven clusters. The dimension of the entire cleaned data set is then reduced according to the combining results from the entire data set and each cluster (Zhong, & Enke, 2017). In the current era of big data, high volumes of a wide variety of valuable data of different veracity are generated or collected at a high velocity. A rich source of these big data is the stock market. Since the inception of the stock market, people have been trying to "beat" it for the purpose of monetary gain. A stock market is an exchange where people trade shares of companies, also called stocks. The purpose of the exchange is to make it easy to match buyers and sellers together to make transactions. The usual goal of someone participating in the stock market it to generate profit through the buying and selling of stocks. The main way people accomplish this is by buying a stock, waiting anywhere from seconds to decades, and then hopefully selling for more than they bought it for. This is where the common term "buy low, sell high" comes from. There are many factors (e.g., hurricanes) that may affect the stock price. In a paper, the writers present a computational intelligent tool that applies fuzzy logic-based data analytics to predict the effect of hurricanes on the stock market (Camara, et al., 2018). Marketing analytics is a diverse field, with both academic researchers and practitioners coming from a range of backgrounds including marketing, expert systems, statistics, and operations research. A paper provides an integrative review at the boundary of these areas. The aim is to give researchers in the intelligent and expert systems community the opportunity to gain a broad view of the marketing analytics area and provide a starting point for future interdisciplinary collaboration (France, & Ghose, 2019). Prediction of stock market trends is considered as an important task and is of great attention as predicting stock prices successfully may lead to attractive profits by making proper decisions. Stock market prediction is a major challenge owing to non-stationary, blaring, and chaotic data, and thus, the prediction becomes challenging among the investors to invest the money for making profits (Gandhmal, & Kumar, 2019). Stock market is basically nonlinear in nature and the research on stock market is one of the most important issues in recent years. People invest in stock market based on some prediction. For predict, the stock market prices people search such methods and tools which will increase their profits, while minimize their risks. Prediction plays a very important role in stock market business which is very complicated and challenging process. Employing traditional methods like fundamental and technical analysis may not ensure the reliability of the prediction. To make predictions regression analysis is used mostly. In the paper in relation this topics, the authors survey of well-known efficient regression approach to predict the stock market price from stock market data based. In future, the results of multiple regression approach could be improve using more number of variables (Sharma, et al., 2017).

3. Data and Methodology

The data of this research are obtained from the paper (Nahaei, & Novin, & Khaligh, 2021) and the methodology is in accordance with the method of the paper (Nahaei, et al., 2021). In this research, the library and field methods have been used to collect information. Also, the tool used is the 7-point Likert scale for evaluating factors and also interviews, and the fuzzy clustering method (FCM) has been used for data analysis. In this study, the fuzzy clustering method by programming in software environment MATLAB was implemented. The FCM algorithm has been proposed by Bezdak and has been widely used for regional frequency analysis. In order to express the FCM fuzzy clustering method, a set of data in form of $\{x_1; x_2; x_3; ...; x_n\}$ is considered. The purpose of fuzzy clustering is to classify data into C clusters in the form of a matrix $U = [\mu_{ik}] . C . n$ in which μ_{ik} is the degree of membership and belonging k to the C cluster is modeled as follows: (Bezdek, et al., 1984)

$$\sum_{i=1}^{C} \mu_{ik} = 1; \quad \forall k \in N \tag{1}$$

$$0 \leq \mu_{ik} \leq 1; \quad \forall i \in C; k \in N \tag{2}$$

$$0 \leq \sum_{k=1}^{N} \mu_{ik} \leq N; \quad \forall i \in C \tag{3}$$

In the above relations, i is the number of clusters and k is the number of data. On the other hand, it can be shown that by minimizing the following objective function, the data in each cluster will be more similar than the data in other clusters.

$$J = \sum_{i=1}^{C} \sum_{k=1}^{n} \mu_{ik}^m d_{ik}^2 = \sum_{i=1}^{C} \sum_{k=1}^{n} \mu_{ik}^m ||x_k - V_i||^2 \tag{4}$$

In the above relation, m is a number greater than one that controls the degree of membership, x_k is the data vector, and V_i is the center of the i cluster, as well as $||x_k - V_i||^2$ is the Euclidean distance between the data and the center of the clusters, which are often based on cluster centers. To minimize (4), (5) and (6) must always be updated in different iterations.

$$V_i = \frac{\sum_{k-1}^{n} [\mu_{ik}] x_k^m}{\sum_{k-1}^{n} \mu_{ik}{}^m}; \quad \forall i \in C \tag{5}$$

$$\mu_{ik}^{t+1} = \left[\sum_{j=1}^{c} (\frac{||x_k - V_i^t||}{||x_k - V_j^t||})^{\frac{2}{m-1}} \right]^{-1}; \quad \forall i \in C; k \in N \tag{6}$$

In the above relations, μ_{ik}^{t+1} is the degree of membership of k is from the category of c in repetition (t + 1). The implementation of the proposed algorithm has the following steps:

1. Consider the value of t to be zero and create an initial code p (0).

2. In each iteration, the centers of the clusters were calculated using Equation (5) and a value for m was selected.

3. Calculate μ_{ik}^{t+1} using (6) and update the initial code in the (t + 1) iteration.

Therefore, proper clustering of projects is a crucial decision for organizations, investors and stakeholders, and due to the many influential factors and variables, it is not easy and requires a model

by which appropriate projects can be found for investment due to multiple goals and limitations. For this purpose and consider marketing recycled products of waste management organization of Tabriz Municipality by obtaining the opinion of experts regarding the review and prioritization of investment and participatory projects in this article, FCM fuzzy clustering method was used.

Recycled products of important investment projects (10 projects) in the Waste Management Organization of Tabriz Municipality through interviews and field research among experts as follows:

A- Energy extraction project from waste (electricity and heat): 28 product.

B- Project for organizing informal recyclers: 7 product.

C - Construction waste recycling project: 10 product.

D- Construction project of a specialized recycling town: 14 product.

E- Project to replace gasoline motorcycles with electric ones: 4 product.

F- Project of scrapping used cars: 32 product.

G- Recycled tire recycling project: 10 product.

H- Glass recycling project: 4 product.

I - Electronic waste recycling project: 48 product.

J - Plastic recycling project: 96 product.

4. Results and discussion

The purpose of clustering is to divide the data into a set of categories in which each category is more similar and closer to each other than the data of other categories. In this study, for marketing of recycled products, the fuzzy clustering method by programming in software environment MATLAB was implemented. The survey of experts with the Likert scale (1-7) is as shown in Table 1 below. Due to the heterogeneity of marketing methods and low diversity of recycled products, by analyzing the opinions of experts, projects B, E and H were left out of the research.

Table 1. Expert Survey on Projects

Project / Expert	A	C	D	F	G	I	J
1	4	4	2	2	3	2	7
2	7	7	4	7	7	2	6
3	5	3	7	7	6	2	7
4	6	4	5	7	5	4	7
5	7	2	6	7	4	5	7
6	6	4	5	6	3	6	5
7	7	7	4	4	7	6	2
8	4	6	6	5	4	3	5

Using MATLAB software, Inputs: number of data points (D): 8 and number of clusters (N): 3 and m: 2 and number of iterations: 1000 and stop threshold value: 0.00001, centers of clusters are shown in Table 2 below.

Table 2. Cluster centers (each row corresponds to a cluster)

Project / Cluster	A	C	D	F	G	I	J
Cluster I	4.2354	6.2534	6.2315	6.2568	4.2356	2.3254	5.9230
Cluster II	4.2358	5.2478	5.1218	5.9632	5.0124	3.1125	5.4203
Cluster III	5.4125	6.1452	4.2325	6.2145	5.2148	2.9514	4.9992

Degree of membership of each project to each of the clusters (each row related to each cluster, each column related to the projects) means the degree to which each project belongs to each cluster. Selecting the highest membership level and place the project in that cluster, projects related to each cluster in the specified table will have a higher priority due to the 1-7 Likert range of numbers close to 7. In fact, cluster I has the highest priority and cluster Π has the lower priority and cluster Ш has the lowest priority. The projects were divided into three clusters, and membership rates, cluster centers, and other details are listed in the table 3.

Table 3. Degree of membership of each project to each of the clusters

Project / Cluster	A	C	D	F	G	I	J
Cluster I	0.2540	0.4541	0.4256	0.2251	0.2456	0.0142	0.7562
Cluster II	0.4562	0.6532	0.3215	0.4215	0.6324	0.1256	0.2936
Cluster III	0.2145	0.1247	0.1025	0.4253	0.1715	0.9852	0.0111
Preferred	II	II	I	III	II	III	I

The assignment of projects to clusters in Table 3 is obtained based on the maximum membership rate. The results are amazing. According to marketing methods and companies involved in selling and exporting marketing products, recycled electronic products and auto parts are in a cluster, both of which are marketed from one source of the organization. On the other hand, the recycling of municipal and plastic products, which have the highest investment in the organization, are in the highest cluster. The second cluster is justified by the most important element of the marketing mix, the product. All three energy recovery products, construction waste and tire waste are products that the private sector plays a key role in recycling. In other words, this cluster represents the outsourcing of municipal duties and its oversight of the marketing of recycled products.

5. Concluding remarks

Tabriz Municipal Waste Management Organization is one of the important organizations in sustainable urban revenue generation. This organization processes more than one hundred types of recycled products with the investment of municipalities and private companies. One of the important problems of this organization is the marketing of these products in the country and more importantly the ground for the export of these products. Some recycled materials are used in many industrial areas of the country and can pave the way for business opportunities. Unfortunately, in the organization, there is no scientific and research-oriented approach to organizing recycled products and marketing these products. One of the important tools of marketing management is paying attention to the marketing mix and the most important element of the product. In this study, we focused on this element and recycled products from the most important projects of Tabriz Municipality Waste Management Organization.

In previous studies, the most important projects of this organization and investment priorities in these projects on recycled products were identified. In this paper, by studying different methods to achieve a single plan for the organization in order to introduce their products with an export-oriented approach, the fuzzy clustering method was used. Through this method, both priority recycled products and related clusters were graded in order to take advantage of the best product-based marketing practices. The results and analysis of the proposed model show that the project of organizing informal recyclers, the project of replacing gasoline motorcycles with electric, and the project of recycling glass did not have products that could be offered to the market and were therefore removed from the analysis. On the other hand, the plastic recycling project and the construction project of a specialized recycling town with various recycled products that are intended for it, have a higher priority for export. The realization that most of the town's products are somehow related to recycled plastic products ensures that both projects are in the same cluster. Future research focusing on other marketing elements such as price and distribution methods of recycled products can draw appropriate strategies for the Waste Management Organization of Tabriz Municipality.

Conflicts of Interest

No potential conflict of interest was reported by the authors.

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