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## Method Article

# Implementing a multi-criteria decision-making approach to a new party's election campaign – A case study<sup>☆</sup>



Irit Talmor

*Western Galilee College, Sir Harry Solomon School of Management, Akko, Israel*

## A B S T R A C T

During pre-election campaigns, parties make great efforts to persuade constituents to vote for them. Usually, new parties have smaller budgets and fewer resources than veteran parties. In particular, the more heterogeneous the party's electorate, the more critical the issue of resource allocation is. This paper presents a method to allocate new party's campaign advertising resources efficiently to maximize its voters. The model developed uses Pareto principle and multi-criteria approach and integrates party's confidential data together with an official open-to-all data. The model produced clear and unbiased results, and these advantages made it effective and user-friendly for the strategic team and campaign managers. We implemented the model on a specific new party during the intensive political period before the April 2019 elections in Israel.

- This paper analyses the issue of allocating new party's campaign advertising resources efficiently to maximize its voters.
- Our model integrates Pareto principle with multi-criteria decision-making approach and uses the party's confidential data together with official open to all state data.
- The model produced clear and unbiased results, and these advantages made it effective and user-friendly for the strategic team and campaign managers.

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## A R T I C L E I N F O

*Method name:* Multi-Criteria Decision-Making

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E-mail address: [irit.tlmr@gmail.com](mailto:irit.tlmr@gmail.com)

## Specifications Table

Subject Area	Economics and Finance
More specific subject area	Operations Research
Method name	Multi-Criteria Decision-Making
Name and reference of original method	Multi-Criteria Decision-Making see: Zopounidis, C., & Doumpos, M. [3] . <i>Multiple Criteria Decision Making</i> . <a href="https://doi.org/10.1007/978-3-319-39292-9">https://doi.org/10.1007/978-3-319-39292-9</a> .
Resource availability	N/A

## Background

A pre-elections political campaign of a new party can be compared to the marketing campaign of a new commercial product. In both campaigns huge efforts are made in order to persuade voters (consumers) to choose the new party (product) over the other better-known parties (products). However, there are some important differences between these campaigns. The first involves the degree of freedom available to the company vs. the political party. A company is free to decide when to launch its commercial campaign and when to end it, whereas a party conducts its political campaign in a time frame that is dictated by law. Another important difference is related to the timing of the marketing campaign. Unlike standard marketing campaigns, the election campaign of a new party is conducted simultaneously with those of all the other parties.

When comparing large, veteran party to a small, novice party in the context of elections campaign, three major differences arise. A large, veteran party has a steady core of loyal voters who always vote for it, can present proof of tangible results to actual and potential constituents, and has a steady federal budget to support its activities. None of these advantages exist for small novice party. Moreover, a small novice party should also overcome extra obstacles, such as make itself known to the voters, attract their attention and excite the voters in a way that will push them to vote for it.

Given these factors, the advertising that the new party utilizes should be as precise and targeted as possible during the campaign. Achieving this precision is not a simple task, given the abundance of advertising alternatives and their various target audiences. In this article we present an approach for supporting the party's strategic team decisions referring to allocation of budget for the physical advertisement, such as outdoor signage, flyers, and billboards among the different localities.

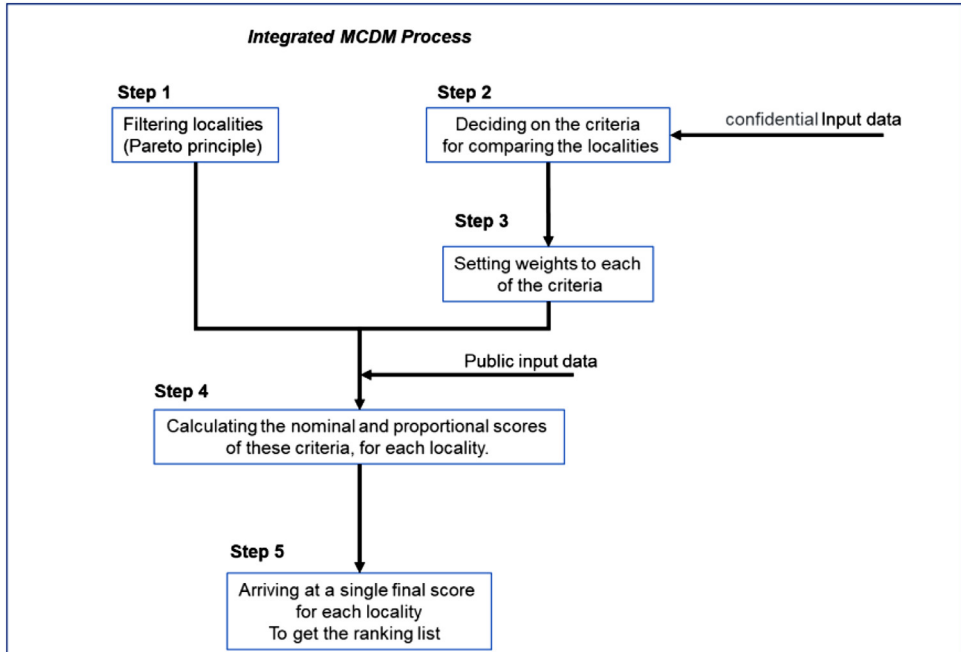
Our approach is novel in two regards. First, it utilizes a multi-criteria decision making (MCDM) methodology and various techniques to weighting criteria in the context of political campaigns. The second is the data used to test our model, which combine a confidential dataset from the party and information from public databases. The advantages of our model are its transparency and simplicity, which make it a useful tool for campaign managers and party leaders. We implemented the model during the April 2019 election campaign in Israel as a case study.

## Methodology

Our approach utilizes the multi-criteria decision making (MCDM) approach, which selects the best alternative out of a finite set of alternatives subject to a set of pre-defined criteria. The MCDM approach and its ranking methods have been the focus of a great deal of attention in the academic literature [1–3].

There are many variations of MCDM models. In some models the alternatives are given, and the criteria should be analyzed, while in others the criteria are known but the alternatives should be determined [4]. MCDM models also differ in the techniques they use [5]. Popular subjective techniques in that context are pair-wise comparisons, distance evaluations and DEA [2,6–8]. The latest is a mathematical approach which is often used for benchmarking in operations management. A comprehensive survey of MCDM models and variations is found in Dotoli et al. [9].

MCDM approach is widely implemented in real-life areas, such as economics [10], engineering [11,12] and even in the public sector [9]. However, it is rarely used in issues referring to elections or political campaign. A unique example of implementing MCDM to analyze the problem of selecting candidates in E-voting is found in [13].



**Fig. 1.** 5 steps of the MCDM process.

The current paper suggests an implementation of an MCDM approach in the context of political campaign. The goal of our model is to determine in which localities the new political party would be best advised to utilize its budget for maximum effect. It is done in 5 steps, as shown in Fig. 1. Detailed explanations and the application of the process on a case study are given hereafter.

## Case study

In the election of April 2019 in Israel 40 parties were competing - 29 of them were new. One party in this group was “Zehut” (hereafter denoted by the letter “Z”). Although “Z” was unknown and resource-poor at the beginning of the campaign, its strategic team was determined to maximize the party achievements in the elections. One of the issues that concerned the team was how to allocate budgets among various advertising alternatives (i.e., digital media, the press and physical formats, social networks etc.). A sub-issue in this context was how to prioritize the allocation of the resources for the physical formats such as outdoor signage, flyers, and billboards among the different localities. This was done in 5 steps, as shown in the graphical abstract.

### Step 1: Filtering localities

According to official data, there were 1195 localities in Israel in 2019. Dealing with so many localities was impractical, so we conducted a preliminary, two-stage process of selecting the main localities on which to focus. First, we identified 145 localities whose electoral profile was homogeneous and very different from the platform of “Z” and removed them from the list. Second, we applied Pareto’s principle. The 1050 remaining localities were sorted in descending order of their number of voters, until a threshold of 80% of the total number of relevant voters was reached. At the end of this second stage, 70 localities remained on the sub-list, containing about 3.0 million voters (out of about 3.6 million total voters in the 1050 localities). Each locality on this sub-list had more

than 10,000 voters in the previous elections (two localities had more than 200,000 voters, 14 localities had 50,000–200,000 voters, and 56 localities had 10,000 to 50,000 voters).

### Step 2: Deciding on the criteria

The party hired a respected political research firm to collect and analyze essential data for its campaign. The research firm conducted in-depth interviews with a representative sample of 1007 people and led six focus groups consisting of 10–15 people each. The researchers together with members of the party's strategic team analyzed the results of the questionnaires and the transcription to decide about the slogans and campaign topics, and to characterize the potential voter. We used those characteristics as criteria in our model.

The results of the analysis showed that potential voters for "Z" were young, educated and earned an average salary. In addition, the analysis found that there was a substantial potential electorate among immigrants from the former Soviet Union who came to Israel during the 1990s. Other characteristics, such as previous political orientation or intensity of religious belief, were not found to be meaningful in this context.

### Step 3: Setting weights for the criteria

The issue of setting weights for the criteria has been widely discussed in the literature, mainly because there are no set guidelines for prioritizing the criteria and determining their weights. To avoid biased judgment, we set the weights in two stages. First, we ranked the criteria qualitatively based on the statistical significance levels obtained in the preliminary analysis: the more significant the criterion, the higher it was ranked. Second, we chose a simple and easy to understand 3 weighting techniques that were presented in Barron and Barrett [14]:

- a. Equal weights (EW). This is the simplest technique. It is used when the criteria cannot be rated or prioritized - either because of lack of information or because the information indicates that all of the criteria have the same significance. In this case, given  $N$  criteria, the weight of each criterion will be  $1/N$ . For example, in the case of four criteria, the weight of each is 25%.
- b. Rank-sum (RS). In this technique the weights are linearly proportional to their significance rank, and their sum is normalized to 1. For simplicity, assume that the criteria are arranged in an order that is identical to their importance (i.e., criterion 1 is ranked higher than criterion 2 and so on until the last, least important criterion indexed  $N$ ). In such a case the formula for the weight of the  $j$ th criterion is:

$$w_j = \frac{N - j + 1}{\sum_{k=1}^N k} = \frac{2(N - j + 1)}{N(N + 1)} \quad (1)$$

In the case of four criteria, the weights are: 40%, 30%, 20%, 10%.

- c. Rank-order centroid (ROS). In this technique the weights are computed from the vertices of a simplex and their sum is normalized to 1. As before, the order of the criteria is equal to their importance. The formula for the weight of the  $j$ th criterion is:

$$w_j = \frac{1}{N} \sum_{k=j}^N \frac{1}{k} \quad (2)$$

In the case of four criteria, the weights are: 52%, 27%, 14%, 6%.

Table 1 lists the four criteria, in descending order of importance, along with their weights using these three techniques.

### Step 4: Calculating the nominal and proportional scores

Next, we calculated the nominal scores of the localities in each of the criteria. It should be noted that in many cases, the MCDM score matrix is created based on expert evaluations or brainstorming

**Table 1**  
Criteria, criteria definitions, and weights in each technique.

#	Criterion	Definition	EW	RS	ROC
1	Age group	Rate of people ages 20–34 in locality	0.25	0.4	0.52
2	Country of origin	Rate of people in locality who are immigrants from the former Soviet Union	0.25	0.3	0.27
3	Educational level	Rate of highly educated people in locality	0.25	0.2	0.15
4	Income	Gap, in absolute value, between the nationwide average income and locality's average income	0.25	0.1	0.06

(e.g., pairwise comparison). The complexity of this process, the difficulty of maintaining internal traceability, and the inherent subjectivity are key arguments made by critics against the MCDM method and AHP process [15,16]. However, these shortcomings are avoided in our case, because the score matrix was objectively calculated, using independent external resources. First, we extracted the data of demographic and socioeconomic of localities throughout Israel from official sources [17], and extracted the information on voting patterns from the official website of the Central Election Committee [18]. We also used other public databases such as those in Hovav [19] and in Results of the 2015 elections by neighborhood [20]. Both these databases presented geographic results map of the former elections. This visualization enabled to identify the political opponents not only in localities resolution but also in neighbourhood resolution. Second, we normalized these nominal scores as follows. A proportional score of the *i*th-criterion in the *j*th-locality is the quotient of the nominal score divided by the maximum score calculated in this criterion [21], namely:

$$y_{ij} = \frac{x_{ij}}{\max_j \{x_{ij}\}} \quad i = 1, 2, \dots, N \tag{3}$$

where *N* is the number of criteria, *x<sub>ij</sub>* is the nominal score of the *i*th-criterion in the *j*th-locality, and *y<sub>ij</sub>* is the relative score of the *i*th-criterion in the *j*th-locality.

For example, to calculate the score of a locality regarding the criterion “age group”, we first obtained the percentage of residents ages 20–34 in each of the 70 localities. The maximum value in this criterion was 28.7 (in the city of Tel Aviv-Jaffa). Then, we used this value to calculate the proportional scores of all the 70 localities according to Eq. (3), to get their proportional scores. Thus, the nominal score of Acre – 24.9 – was normalized to 0.87 (=24.9/28.7), the nominal score of Afula – 22.3 – was normalized to 0.78, and so on. We repeated the same process in all the criteria, to get normalized scores. The list of nominal and normalized scores of the 70 localities in each criterion is found in Table A.1 in the appendix.

*Step 5: Arriving a single score for each locality and rank localities*

The last step was to calculate the final scores of the localities. In our study we used the classic and popular weighted sum (WS) model. According to this model, the final grade of an alternative is obtained by summing the multiplication of the grades for each criterion by the weights of the criteria, namely:

$$Final\_Score(j) = \sum_{i=1}^N w_i y_{ij} \quad \forall j \tag{4}$$

The full scores and rankings are listed in Table A.2 in the appendix.

Analyzing the final scores shows that the same 15 localities are ranked in the top 20 of the three techniques – see Table A.3 in the appendix. Thus, we recommended that the party’s strategic team focus its efforts on these 15 localities (hereafter “focused list”).

**Table 2**

Number of localities in which vote percentage for "Z" was above required threshold / above its average achievement.

	Sub list	Focused list
Number of localities	70	15
votes percentage > 3.25%	20	8
votes percentage > 2.74%	47	13

## Results

The elections were held on April 9, 2019. None of the 29 new parties that competed reached the 3.25% threshold required to obtain a seat in the Knesset. "Z" received 2.74% of the votes, whereas only one other new party received more votes than it (3.22%, which was also below the threshold) [22]. There are several explanations for this failure, all of them based on the fact that voting patterns depend on many variables, some of which arise only a few days or a few hours before election day, or even during election day. Nevertheless, it should be noted that "Z" started its campaign with only 0.4% support but ended the election with 2.74% of the votes.

Analysis of the results revealed that "Z" received more than 3.25% of the votes in 20 of the 70 localities on our sub-list, and more than 2.74% in 47 of the localities. In our focused list, the party gained much better results: 8 and 13, respectively (Table 2).

This outcome is particularly striking when considering that as a new party, "Z" had no core of voters or any previous empirical data on which to base decisions about how to allocate its resources for maximum effect. Yet, the party did not cross the electoral threshold. There are several explanations for this. First, voting patterns depend on many variables, some of which arise only a few days or a few hours before election day, or even during election day. Thus, the model provides a simple, valid tool for making data-driven decisions about allocating resources that can be easily updated for future election campaigns.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.mex.2021.101328](https://doi.org/10.1016/j.mex.2021.101328).

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