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Araştırma Makalesi ● Research Article

A Novel City Benchmarking Methodology: Multidimensional Managerial Insight

Yeni Bir Şehir Kıyaslama Metodolojisi: Çok Boyutlu Yönetimsel İçgörü

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Abstract: Benchmarking is a managerial tool that enables decision-makers to make critical inferences about their organizations from different perspectives such as their strengths and weaknesses, priorities, past and future. Benchmarking cities receives considerable research interest mainly because of its potential benefits to managers in evaluating policies and making strategic decisions. Current research on city benchmarking focuses on identifying the benchmark factors and developing methods for measuring the benchmark scores. In other words, the existing methods aim to derive city benchmark scores by combining the weighted factors and compare cities based on their respective scores. However, policymakers tend to request more detailed information to guide their policies, rather than having a simple scoring. This study aims to fill this gap with a novel benchmarking approach. The proposed approach relies on the sensitivity analysis of the multi-criteria decision-making technique adopted in benchmarking, and offers decision-makers three main outputs for each city: (i) delivering a consensual ranking that is free of decision-maker bias, (ii) indicating priority areas under which require the least effort to achieve better ranking, and (iii) revealing the relative effects of the previous policy results and projecting the future ranking if the current policies remain same. The implementation of the proposed methodology is illustrated by a case study. The case study highlights that adopting the proposed methodology is promising since it provides insightful managerial information to decision-makers.

Keywords: Benchmarking, Cities, Multi criteria decision-making, Sensitivity analysis

Öz: Kıyaslama, karar vericilerin kuruluşları hakkında güçlü ve zayıf yönleri, öncelikleri, geçmişi ve geleceği gibi farklı perspektiflerden kritik çıkarımlar yapmalarını sağlayan bir yönetim aracıdır. Şehirlerin kıyaslaması, yöneticilere politikaların değerlendirilmesi ve stratejik kararlar alınması açısından sağladığı faydalar nedeniyle bilim insanlarının ilgisini çekmektedir. Şehir kıyaslaması üzerine mevcut araştırmalar, kıyaslama faktörlerini belirlemeye ve kıyaslama skorlarını ölçmek için yöntemler geliştirmeye odaklanmıştır. Bir diğer ifadeyle, mevcut yöntemler, şehirleri karşılaştırmak için ağırlıklı faktörleri birleştirerek tek bir puan hesaplamayı amaçlamaktadır. Bununla birlikte, politika yapıcılar, politikalarına rehberlik etmek için basit bir puanlamaya sahip olmak yerine daha ayrıntılı bilgi talep etme eğilimindedir. Bu çalışmada önerilen kıyaslama yaklaşımı bu boşluğu doldurmayı amaçlamaktadır. Önerilen yaklaşım, kıyaslama için kabul edilen çok kriterli karar verme tekniğinin duyarlılık analizine dayanmaktadır ve karar vericiler her şehir için üç ana çıktı sunmaktadır: (i) karar verici yanlılığından

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uzak, uzlaşıya dayalı bir sıralama sunar, (ii) daha iyi sıralama elde etmek için minimum çaba gerektiren öncelikli alanları gösterir ve (iii) geçmişten bugüne uygulanan politikaların sonuçlarının göreceli etkilerini sergiler ve geçmişten bugüne uygulanan politikalar devam ettirilirse şehrin gelecekteki sıralamasını yansıtır. Metodolojinin uygulanışı bir vaka çalışması ile gösterilmektedir. Vaka çalışması, önerilen metodolojiyi uygulamanın karar vericiye önemli yönetimsel çıkarımlar sunması sebebiyle oldukça ümit verici olduğunu vurgulamaktadır.

Anahtar Kelimeler: Kıyaslama, Şehirler, Çok kriterli karar verme, Duyarlılık analizi

Introduction

Benchmarking is a management tool enabling decision-makers to identify the organizations' strengths and weaknesses against the competitors are of concern. It also allows decision-makers an approach to prioritize areas for improvement and set realistic targets by highlighting the gap between best practices and others in the market (Vishwakarma et al., 2012). This, in turn, makes the benchmarking essential for organizations seeking competitive advantage. Therefore, benchmarking has recently received a great amount of attention and been utilized in various applications.

Cities aim to be more competitive as compared to the other cities and thus, seek strategic policy advices that serve this purpose (Giffinger et al., 2010). In this context, city benchmarking becomes vital for policymakers in visualizing the competitive performance of the cities in certain aspects and motivates them to develop strategic policy advices that have the potential of improving cities' performances (Kitchin et al., 2015). Put in other words, city benchmarking provides valuable insights on how public policies affect the cities individually and which strategies should be taken into account to better position cities in the future (Luque-Marínez & Muñoz-Leiva, 2005; Sáez et al., 2020). These practical evidences motivated many researchers to concentrate on comparing cities in terms of various macro criteria such as quality of life (Gawlak et al., 2021; Kaklauskas et al., 2018; Prakash et al., 2016; Vakilipour et al., 2021), urban competitiveness (Du et al., 2014; Liu et al., 2016; Sáez et al., 2017), energy efficiency and sustainability (Ahmad et al., 2015; Keirstead, 2013; Papadopoulos & Kontokosta, 2019).

The existing research on city benchmarking has mainly focused on developing evaluation indexes and methods to measure benchmarking criteria under consideration. For instance, Sáez & Periáñez (2015) constructs an urban competitiveness index based on three dimensions covering 31 indicators in total. Kose et al. (2020) identify seven dimensions to be taken into account in evaluating the livability of cities. González-García et al. (2019) propose 38 indicators grouped in three dimensions to assess municipalities' sustainability. When it comes to evaluation methods, multi-criteria decision analysis (MCDA) has been widely utilized by scholars. More recently, Tang et al. (2019) propose a modified Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methodology with grey relational analysis to evaluate the urban sustainability level of cities. Ozkaya & Erdin (2020) measure the smart city performance based on the Analytical Network Process (ANP) and TOPSIS. Ghalehteimouri et al. (2020) have applied the ELECTRE III method to compare the cities considering the quality of life and competitiveness. Činčikaitė & Meidute-Kavaliauskiene (2021) assess the competitiveness of Baltic capitals from the sustainable development viewpoint using the Simple Additive Weighting (SAW) and Complex Proportional Assignment Method (COPRAS). In addition to MCDA, there have been various methods adopted in earlier research, such as Principal Component Analysis (Jiang & Shen, 2010), Data Envelopment Analysis (Wang et al., 2017).

The evaluation methods are utilized to calculate a single score from the weighted aggregation of dimensions so as to compare cities. However, policymakers tend to demand more detailed information on cities rather than having a simple ranking. Therefore, one needs to conduct further analysis to extend the knowledge on the drivers of cities' performances. To address this need, this study provides a methodological approach that aims to (i) determine a clear relative city ranking, (ii) develop competitive and effective future policies by determining areas that require improvements in line with specific indicators and (iii) observe the outputs of the policies applied. The proposed approach makes use of forecasting and high dimensional sensitivity analysis of multi-criteria decision model in order to uncover the managerial information hidden in the benchmarking data. More specifically, the proposed approach adopts TOPSIS as the core method and involves three steps. In the first step, the consistent ranking of the cities is determined by simulating the ranking process with different weight sets in order to avoid the decision-maker bias. Then, priority sectors are determined by virtually increasing the values in each indicator and analyzing the minimum amount of increase that will change the current ranking. Finally, the future ranking of the cities is provided with predicted data under the assumption that the data will keep its pattern over time and the ongoing policies will remain unchanged.

The rest of the paper is organized as follows. In the following section, we describe the framework of the proposed methodology. Section 3 is devoted to implementing the proposed approach to a case study regarding with cities in Turkey. Section 4 concludes our study and provide directions for future research.

Methodology

The multi-criteria decision-making approach includes many techniques, such as AHP, TOPSIS, VIKOR, ELECTRE, which can be used for ranking, classification, and selection problems by evaluating several alternatives within various criteria. It is utilized as a ranking tool in city benchmarking. Thanks to the sensitivity analysis, a ranking tool can generate more outputs than simply ranking alternatives. Multi-criteria decision-making approaches are sensitive to the change of basic components of the decision matrix such as data and weights. This sensitivity makes it possible to expand the analysis and obtain useful outputs to satisfy the needs of the decision-makers (Triantaphyllou & Sánchez, 1997).

The methodological approach in this study requires the selection of one of the multi-criteria decision-making methods as a starting point. As noted earlier, we adopt TOPSIS as a core method. This is mainly due to the fact that TOPSIS is simple, rational, requires minimal information and has a mechanism that can reflect decision-making behavior (Kim et al., 1997). Also, the MCDA literature offers various TOPSIS methods to handle group decision making, interval data set and linguistic expressions. Therefore, we first explain the TOPSIS method in this section. Then, the proposed approach is explained briefly step-by-step. The scheme of the proposed approach also given in Figure 1.

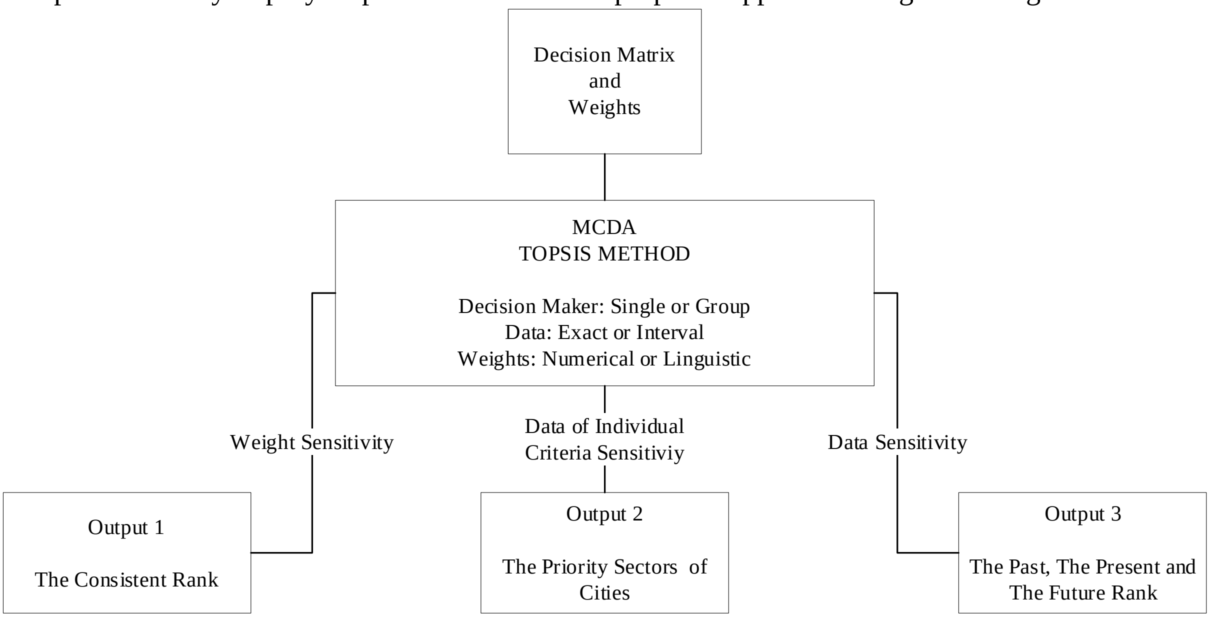

Figure 1. The Scheme of The Methodological Approach

The approach consists of two stages. In the first stage, the details of the TOPSIS method are clarified in accordance with the benchmarking environment. The number of decision-makers, the type of data and criterion weights are important in determining the TOPSIS version to be used in the benchmarking. The second stage includes obtaining the outputs based on the sensitivity analysis. Details on the TOPSIS method and obtaining the outputs are explained in the following subtitles of the section.

TOPSIS Method

TOPSIS ranks the alternatives by considering the distance from the positive ideal solution (PIS) and the distance from the negative ideal solution (NIS). PIS consists of a combination of the best values in each criterion, while NIS consists of the worst values. Standard TOPSIS steps are follows:

Step 1. Construct the decision matrix and determine the weight of criteria.

Let $A = \{a_1, a_2, \dots, a_m\}(i \in A)$ be the set of alternatives and $C = \{c_1, c_2, \dots, c_n\}(j \in C)$ be the set of criteria, the decision matrix is defined as $X = \begin{bmatrix} x_{ij} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{bmatrix}$. Each x_{ij} represents the performance of alternative i in criterion j. Criteria can be either benefit ($C^o = max$) or cost ($C^o = min$) oriented. Higher value is better in benefit-oriented criteria, while lower value is better in cost-oriented ones.

The significance of the criteria is indicated by weights ($W = \{w_1, w_2, \dots, w_n\}$ and $\sum_{j \in C} w_j = 1$). It is crucial to determine the aggregate performance of alternatives. Weights can be determined using techniques such as pairwise comparison, the Delphi method (Chalgham et al., 2019), expert opinions, surveys, as well as data-based methods, i.e. Entropy (Chen, 2020) and CRITIC (Abdel-Basset & Mohamed, 2020), that do not require human judgment.

Step 2. Normalizing the decision matrix

Normalization is the process of converting data in different units or scales to a normalized scale while determining the overall performance of alternatives. The literature offers various methods for obtaining the normalized matrix ($X \rightarrow N, x_{ij} \rightarrow n_{ij}$). Some of these are as follows:

Table 1. Methods to obtain Normalized Matrix

Technique	Orientation	Formula
Max	Benefit	$n_{ij} = \frac{x_{ij}}{x_j^{max}}$
	Cost	$n_{ij} = 1 - \frac{x_{ij}}{x_j^{max}}$
Max-Min	Benefit	$n_{ij} = \frac{x_{ij} - x_j^{min}}{x_j^{max} - x_j^{min}}$
	Cost	$n_{ij} = \frac{x_j^{max} - x_{ij}}{x_j^{max} - x_j^{min}}$
Sum	Benefit	$n_{ij} = \frac{x_{ij}}{\sum_{i \in A} x_{ij}}$
	Cost	$n_{ij} = \frac{1/x_{ij}}{\sum_{i \in A} 1/x_{ij}}$
Vector	Benefit	$n_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i \in A} x_{ij}^2}}$
	Cost	$n_{ij} = \frac{1/x_{ij}}{\sqrt{\sum_{i \in A} 1/x_{ij}^2}}$

TOPSIS adopts vector normalization. Although normalization formulas serve the same purpose, they contain minor differences. There are studies reporting the effects of these differences on the results (Jahan & Edwards, 2015) as well as some studies claiming that they are not effective (Milani et al., 2005).

Step 3. Calculate the weighted normalized decision matrix

In this step, the normalized decision matrix is weighted by the importance of the criteria for obtaining a weighted normalized decision matrix (V) by the following operation:

$$v_{ij} = w_j * n_{ij}, \forall i \in A, j \in C$$

Step 4. Determine the positive ideal and negative ideal points.

While the positive ideal point (A^+) consists of the best performances of each criterion, the negative ideal point (A^-) is the opposite. The orientation of the criteria is decisive in determining the best or worst performance. For example, while determining the positive ideal point, the best performance is the highest value in a maximum oriented criterion, and the best value is the lowest value in a minimum oriented criterion. The opposite is the case at the negative ideal point.

$$A^+ = (v_1^+, \dots, v_n^+) = (\left(\max_{i\in A} v_{ij} \mid j \in C: C_j^o = max\right), \left(\min_{i\in A} v_{ij} \mid j \in C: C_j^o = min\right))$$

$$A^- = (v_1^-, \dots, v_n^-) = (\left(\min_{i\in A} v_{ij} \mid j \in C: C_j^o = max\right), \left(\max_{i\in A} v_{ij} \mid j \in C: C_j^o = min\right))$$

Step 5. Calculate the separation measures from the positive ideal solution and the negative ideal solution

In this step, the distances of the alternatives to the positive ideal point and the negative ideal point are determined.

$$d_i^+ = \sqrt{\sum_{j\in C} (v_{ij} - v_j^+)^2}, \forall i \in A$$

$$d_i^- = \sqrt{\sum_{j\in C} (v_{ij} - v_j^-)^2}, \forall i \in A$$

Step 6. Calculate the closeness coefficient to the ideal solutions

In this step, the distance coefficient (R) of each alternative to the ideal points is calculated, which is the basis of the ranking.

$$R_i = \frac{d_i^-}{d_i^- + d_i^+}, 0 \le R_i \le 1, \forall i \in A$$

Step 7. Rank the preference order

In the last step, the alternatives are ranked in descending order by their distance coefficients.

Standard TOPSIS ranks alternatives in an environment with a single decision-maker and exact data. However, most real-life applications may require the ranking to be determined by group decision making or interval data. In order to ensure that the proposed methodology is still used effectively in different decision-making environments, the standard TOPSIS method should be replaced by the following variations:

- The model in Shih et al. (2007) should be used for group decision making.
- The model in Jadidi et al. (2009) in cases where interval data exists.
- If both interval data and group decision making are concerned, the model in Zavadskas et al. (2008) can be used.
- When criterion weights are expressed linguistically, the model in Jadidi et al. (2008) can be used.

Determining Consensual Ranking

Once the multi-criteria decision method to be used in benchmarking is selected, the weight set should be determined. The weight set denotes the effect of the criteria in the evaluation process. In other words, the weights represent the importance the decision-maker attributes to the criteria. The ranking obtained with a single set of weights may not be generally accepted since each decision-maker have his subjective opinions. To avoid decision-maker bias and determine a consensual ranking, we simulate the ranking with multiple random weight sets as a first step of our approach. This, in turn, allows a large number of decision-makers to be included in the evaluation.

When the ranking is conducted repeatedly based on the weight sets created via simulation, a city might be assigned to the same rank at each turn. This implies that there is a consensus on the ranking of the corresponding city. In a similar manner, the rank of a city might change over the simulation runs. In this case, one is able to observe the percentage of the consensus associated with the ranks of the city. Consequently, simulation-based sensitivity analysis of the weight sets leads to objective, probabilistic information on each city's ranking. As a result of this step, cities can accurately identify their competitors and role models.

Prioritizing Areas for Improvement

In the fierce competitive environment, cities look for effective strategies to manage the resources to be advantageous against their competitors. As such, prioritizing areas for development is of great importance for decision-makers to determine city policies. This step of the proposed approach aims at addressing this need of the decision-makers.

It is well known that the change in each value of the benchmarking data has the potential to affect the ranking of the cities. In this context, if the value of a city in any criterion is virtually increased enough, that might result in a better ranking for the corresponding city. Accordingly, the prioritization of criteria for any city can be obtained by measuring the minimum increase in the value of each criterion that changes the final ranking. Having all the calculations done, the criterion that requires the lowest increase is considered as the priority for the city is of concern. This, in other words, reveal the criterion that can change the ranking of a city with the minimum effort.

We should note that the evaluation outlined above assumes that the unit increase in each criterion value can be realized with the same effort. This might not be the case in practice. In this case, the increase in each criterion should be adjusted with a coefficient representing the difficulty of a unit increase in the corresponding criterion before prioritization the criteria.

The Past, The Present and The Future Rank

The final step in our approach focuses on the change of data over time. The change in the ranking of the cities between two dates can give information about the management performance in the elapsed time. To be able to obtain positive or negative deductions on the city's managerial effort, it is expected that the cities do not perform in parallel to each other throughout the time interval under consideration. Otherwise, the complete ranking remains unchanged.

The same reasoning can also be adopted to rank the cities' positions in future. The data obtained in the past and present time periods forms a time series. Assuming that the data will continue its pattern into the future, that is, cities will maintain the same policies, we can predict a certain future data. When the ranking made with the estimated data is compared with the present ranking, it can be concluded that the policies followed should be changed or preserved. We herein adopt the basic time series forecasting method. Since the ranking obtained with the predicted data will provide a macro evaluation, we prefer a simple and easy-to-use method, rather than a complex method. The pattern of the data determines which time series estimation method to use. At this point, it is important that the data be stationary and contain a trend or seasonality.

Data and Implementation of the Approach

Factors such as natural resources and cheap labor have given cities a competitive advantage in the past. These factors have now been replaced by intellectual capital potential and entrepreneurial opportunities (Johnston, 2011). Parallel to this change, there is a shift towards policies based on the existence of a strong relationship between economic development and entrepreneurship (Ács et al., 2014; Audretsch & Fritsch, 2002). The impact of policies based on entrepreneurship is easily and quickly observed in cities, as entrepreneurs take action effortlessly when the ecosystem is appropriate, and the entrepreneurship increases with the right policies (Audretsch et al., 2015). Similarly, the change in the number of entrepreneurial activities in a city is an indicator of whether the thoughtful strategies are applied to the relevant sector. In this context, monitoring entrepreneurship activities provides important strategic information about policies, resource management ability, etc. Therefore, the change in the entrepreneurial activities of a city is assumed to be a combined reflection of all the factors that affect the performance of the corresponding city.

Turkey is a developing country with the vision of being among the top ten economies in 2023. For this purpose, it applies serious investment, incentive and grant programs to ensure the multi-dimensional development of cities. Here, we benchmark cities of Turkey considering their decision-making and resource management ability that affect the competitiveness over the entrepreneurship activities.

Data

The performance of each city under consideration is measured based on 18 criteria that correspond to the number of entrepreneurial activities with respect to the sector. Table 2 and Table 9 present the sectors of entrepreneurs and cities of Turkey, respectively. Also, all the data used in this study was obtained from TurkStat[1].

The statistical summary of the data is given in Table 3. Note that the 2025 line belongs to the predicted data. A striking detail in Table 3 is that, in some sectors, the minimum value is zero. This is due to the lack of entrepreneurial activity in the sector is of concern, especially in relatively small cities. Another observation from the 2025 predictions is that the increase or decrease in some sectors between 2009 - 2019 does not continue in 2025 due to the difference in the data trend.

Table 2. Entrepreneur Categories

Code	Name
C1	Agriculture, Forestry and Fishing
C2	Mining and Quarrying
C3	Manufacture
C4	Electricity, Gas, Steam and Air Conditioning Production and Distribution
C5	Water Supply; Sewage, Waste Management and Remediation Activities
C6	Construction
C7	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
C8	Transport and Storage
C9	Accommodation and Food Service Activities
C10	Information and Communication
C11	Finance and Insurance Activities
C12	Real Estate Activities
C13	Professional, Scientific And Technical Activities
C14	Administrative and Support Service Activities
C15	Education
C16	Human Health and Social Work Activities
C17	Culture, Arts, Entertainment, Leisure And Sports
C18	Other Service Activities

The statistical summary of the data is shown in Table 3. The 2025 line belongs to the estimated data. A striking detail in Table 3 is that, in some sectors, the minimum value is 0. This is due to a lack of entrepreneurial activity in the sector concerned, especially in small cities. Another detail seen in the 2025 predictions is that the increase or decrease in some sectors between 2009-2019 not continue in 2025 due to the difference in the trend of the data.

[1] https://www.tuik.gov.tr/Home/Index

Table 3. Descriptive Statistics

		C1	C2	C3	C4	C5	C6	C7	C8	C9
2009	Max	1269	873	116506	440	359	47982	260853	92268	52435
	Min	7	0	132	0	0	65	941	736	223
	Mean	272	64	4646	16	22	2275	15154	6516	3478
	Std. Dev.	298	120	13332	67	46	5973	31015	10888	6412
2019	Max	2345	1078	133573	2193	1132	67795	294990	104102	71382
	Min	17	3	179	1	0	125	926	635	318
	Mean	419	81	5566	86	75	3381	16378	6493	4382
	Std. Dev.	457	151	15329	304	148	8257	34807	12201	8579
2025	Max	3360	1218	143877	4085	1706	88467	299377	107573	81119
	Min	0	2	197	0	0	167	842	183	369
	Mean	478	90	6091	161	110	4317	16386	6173	4757
	Std. Dev.	552	169	16540	559	220	10609	35288	12544	9668
		C10	**C11**	**C12**	**C13**	**C14**	**C15**	**C16**	**C17**	**C18**
2009	Max	10700	10234	12097	49124	13153	3293	14668	8597	49105
	Min	14	8	4	57	8	3	6	25	227
	Mean	315	376	496	1926	439	168	532	469	3170
	Std. Dev.	1220	1179	1475	5845	1516	407	1706	992	6053
2019	Max	22015	7738	19868	81784	24516	9027	19335	15163	67589
	Min	17	11	9	104	21	5	11	75	407
	Mean	586	293	804	3148	872	355	637	730	4538
	Std. Dev.	2487	890	2379	9662	2824	1067	2217	1738	8203
2025	Max	28829	5683	23797	100689	31276	12792	20461	18950	77281
	Min	16	0	1	117	29	7	2	88	517
	Mean	768	219	963	3783	1169	478	615	831	5172
	Std. Dev.	3247	656	2846	11852	3626	1504	2328	2163	9296

Consensual Ranking

Each of the 81 cities has different advantages and disadvantages in competition. To avoid decision-maker bias in the ranking of cities, we have simulated the ranking process with a unique 5000 weight set that is randomly generated. The part of the weight set is given in Table 4.

Table 4. Weight set

Weight Set	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18
1	9%	8%	1%	8%	11%	4%	1%	2%	10%	2%	5%	0%	5%	11%	7%	8%	5%	1%
2	10%	9%	1%	6%	5%	9%	9%	10%	5%	10%	6%	1%	1%	0%	2%	1%	10%	4%
3	4%	11%	9%	7%	3%	1%	6%	5%	9%	4%	3%	10%	0%	7%	1%	3%	4%	11%
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
4998	6%	4%	2%	9%	5%	7%	3%	6%	1%	8%	8%	2%	5%	6%	3%	9%	8%	8%
4999	9%	8%	9%	4%	10%	3%	4%	5%	5%	6%	5%	3%	5%	3%	7%	3%	2%	9%
5000	6%	4%	8%	9%	8%	3%	4%	2%	2%	7%	6%	7%	9%	2%	5%	5%	8%	5%

The ranking resulting from each simulation represents the view of a decision-maker. When the simulation results are considered as a whole, an evaluation that satisfies all decision-makers can be made about the rankings of cities. A complete agreement on the rank of some cities can be reached, while in others, there is no consensus, and their rank can only be expressed with probability.

Table 5 presents the consensual ranking result obtained via several simulation runs. For the ease of reading, the table presents only three ranks with the highest probability associated with each city. The results show that the rank of some cities is determined unanimously. There is a complete consensus on the ranks of three cities (A7, A40 and A41). These cities can be considered as outliers.

Table 5. Ranks and percentages of cities

A1*	7	6	8	**A28**	25	24	18	**A55**	29	28	30
	67%	17%	7%		11%	8%	7%		20%	19%	17%
A2	44	45	43	**A29**	30	29	31	**A56**	14	13	15
	19%	16%	11%		11%	9%	9%		34%	25%	22%
A3	25	24	23	**A30**	66	65	64	**A57**	49	48	47
	18%	15%	12%		26%	24%	16%		22%	18%	18%
A4	70	69	68	**A31**	48	50	49	**A58***	8	10	9
	24%	12%	12%		15%	12%	9%		53%	15%	15%
A5	35	36	37	**A32**	24	23	25	**A59**	11	12	10
	10%	9%	9%		44%	26%	25%		24%	23%	21%
A6	56	55	50	**A33**	10	9	11	**A60**	71	72	70
	12%	11%	9%		20%	19%	18%		34%	24%	20%
A7	2			**A34**	50	51	56	**A61**	43	42	41
	100%				11%	10%	10%		13%	11%	9%
A8*	4	5		**A35***	78	77	79	**A62**	56	55	54
	86%	14%			55%	24%	15%		20%	20%	16%
A9*	81	80	79	**A36**	62	77	61	**A63**	33	30	36
	92%	7%	1%		8%	8%	7%		9%	8%	8%
A10	69	63	68	**A37**	18	19	17	**A64**	51	52	53
	18%	14%	13%		21%	19%	14%		13%	13%	11%
A11	15	16	13	**A38**	76	77	79	**A65**	59	57	58
	20%	17%	16%		30%	27%	16%		16%	15%	10%
A12	9	12	13	**A39**	41	40	42	**A66**	21	20	22
	21%	20%	15%		20%	18%	12%		41%	22%	14%
A13	73	71	72	**A40**	1			**A67**	20	21	19
	19%	17%	14%		100%				26%	16%	16%
A14	60	58	59	**A41**	3			**A68***	75	74	73
	16%	13%	13%		100%				52%	32%	8%
A15	79	78	76	**A42**	26	25	28	**A69**	62	67	63
	50%	15%	14%		34%	21%	14%		16%	14%	10%
A16	66	60	61	**A43**	61	62	65	**A70**	34	45	35
	9%	8%	7%		21%	21%	19%		9%	9%	8%
A17	72	73	71	**A44**	60	59	61	**A71**	17	16	18
	27%	24%	16%		20%	18%	15%		23%	14%	14%
A18	64	67	69	**A45**	74	73	75	**A72**	63	68	69
	20%	17%	13%		37%	23%	17%		14%	11%	9%
A19	33	38	57	**A46**	36	39	50	**A73**	16	15	17
	8%	6%	5%		9%	9%	8%		18%	15%	14%
A20	27	26	28	**A47**	18	19	17	**A74**	42	41	43
	9%	8%	6%		18%	13%	12%		18%	14%	12%
A21*	5	6	7	**A48**	58	59	60	**A75**	27	26	25
	61%	19%	16%		23%	22%	13%		19%	18%	11%
A22	30	29	28	**A49**	28	27	30	**A76***	80	81	79
	21%	20%	17%		14%	13%	9%		89%	6%	5%
A23	68	69	70	**A50**	26	27	28	**A77**	51	52	50
	13%	10%	9%		18%	10%	5%		22%	16%	15%
A24	32	34	33	**A51**	76	77	79	**A78**	46	34	31
	17%	14%	11%		31%	28%	13%		10%	9%	6%
A25	12	11	10	**A52**	9	8	10	**A79**	55	56	57
	14%	12%	10%		25%	21%	17%		14%	13%	12%
A26	22	23	21	**A53***	6	5	4	**A80**	35	34	36
	46%	23%	14%		57%	25%	11%		13%	10%	7%
A27	54	53	55	**A54**	32	38	33	**A81**	47	49	48
	23%	21%	16%		16%	13%	12%		16%	10%	8%

The city having a probability more than 50% in any rank is considered to be voted by the majority of the decision-makers. Cities with the majority of votes are highlighted (*) in Table 5. The rank with the second-highest probability, for cities ranked with the majority of votes, can be interpreted as the orientation of the city. Let us consider the cities A1 and A21, which have the majority of votes on 7th (67%) and 5th (61%) ranks, respectively. The orientation of the corresponding cities is 6th rank. This implies that A1 might move up one rank whereas A21 has the possibility to drop one rank down. Based on this information, A1 may realize that it is headed for a higher rank and be motivated to change in this direction, A21 may realize that it must recognize the trend towards a lower rank and try to prevent the fall by taking the necessary measures. In both cases, having consensual ranking increases the awareness of cities.

There is high similarity and competitive pressure between the remaining cities, whose rank cannot be determined even with the majority of votes. This does not give clear information about the ranks of these cities yet helps decision-makers to identify the cities in intense competition. In order to provide useful information from competition between cities, Table 5 should be read vertically. To that end, we provide

Table 6, which is obtained directly from the information given in Table 5, showing the strongest candidate cities and corresponding probabilities for each rank. As such, rank-based evaluation paves the way for identifying the competitors of each city.

Table 6. Percentage of cities belonging to ranks

Rank	Cities		
1	A40		
	100%		
2	A7		
	100%		
3	A41		
	100%		
4	A8	A53	A21
	86%	11%	3%
5	A21	A53	A8
	61%	25%	14%
6	A53	A21	A1
	57%	19%	17%
7	A1	A21	A52
	67%	16%	8%
8	A58	A52	A33
	53%	21%	11%
9	A52	A12	A33
	25%	21%	19%
10	A59	A33	A52
	21%	20%	17%
11	A59	A33	A58
	24%	18%	13%
12	A59	A12	A25
	23%	20%	14%
13	A56	A11	A12
	25%	16%	15%
14	A56	A11	A73
	34%	13%	12%
15	A56	A11	A73
	22%	20%	15%
16	A73	A11	A71
	18%	17%	14%
17	A71	A37	A73
	23%	14%	14%
18	A37	A47	A71
	21%	18%	14%
19	A37	A67	A47

Rank	Cities		
	19%	16%	13%
20	A67	A66	A26
	26%	22%	10%
21	A66	A67	A26
	41%	16%	14%
22	A26	A66	A3
	46%	14%	10%
23	A32	A26	A3
	26%	23%	12%
24	A32	A3	A42
	44%	15%	10%
25	A32	A42	A3
	25%	21%	18%
26	A42	A75	A50
	34%	18%	18%
27	A75	A42	A49
	19%	13%	13%
28	A55	A22	A49
	19%	17%	14%
29	A55	A22	A75
	20%	20%	11%
30	A22	A55	A29
	21%	17%	11%
31	A55	A22	A24
	15%	15%	9%
32	A24	A54	A22
	17%	16%	8%
33	A54	A24	A63
	12%	11%	9%
34	A24	A80	A54
	14%	10%	10%
35	A80	A54	A5
	13%	12%	10%
36	A46	A24	A5
	9%	9%	9%
37	A54	A5	A39
	9%	9%	7%

Rank	Cities		
38	A54	A39	A29
	13%	8%	7%
39	A54	A39	A46
	10%	10%	9%
40	A39	A74	A2
	18%	10%	10%
41	A39	A74	A61
	20%	14%	9%
42	A74	A39	A61
	18%	12%	11%
43	A61	A74	A2
	13%	12%	11%
44	A2	A61	A74
	19%	9%	9%
45	A2	A70	A61
	16%	9%	7%
46	A2	A78	A57
	10%	10%	8%
47	A57	A81	A46
	18%	16%	7%
48	A57	A31	A81
	18%	15%	8%
49	A57	A81	A77
	22%	10%	9%
50	A77	A31	A34
	15%	12%	11%
51	A77	A64	A34
	22%	13%	10%
52	A77	A64	A27
	16%	13%	12%
53	A27	A62	A64
	21%	14%	11%
54	A27	A62	A79
	23%	16%	12%
55	A62	A27	A79
	20%	16%	14%
56	A62	A79	A6

Rank	Cities			Rank	Cities			Rank	Cities		
	20%	13%	12%		24%	19%	13%		37%	32%	10%
57	A65	A48	A79	**66**	A30	A18	A4	**75**	A68	A45	A51
	15%	12%	12%		26%	11%	11%		52%	17%	9%
58	A48	A14	A44	**67**	A18	A30	A69	**76**	A51	A38	A15
	23%	13%	13%		17%	14%	14%		31%	30%	14%
59	A48	A44	A65	**68**	A10	A10	A4	**77**	A51	A38	A35
	22%	18%	16%		13%	13%	12%		28%	27%	24%
60	A44	A14	A48	**69**	A10	A18	A4	**78**	A35	A38	A15
	20%	16%	13%		18%	13%	12%		55%	15%	15%
61	A43	A44	A14	**70**	A4	A60	A13	**79**	A15	A38	A35
	21%	15%	10%		24%	20%	14%		50%	16%	15%
62	A43	A69	A44	**71**	A60	A13	A17	**80**	A76	A9	A15
	21%	16%	11%		34%	17%	16%		89%	7%	3%
63	A72	A10	A69	**72**	A17	A60	A13	**81**	A9	A76	A15
	14%	14%	10%		27%	24%	14%		92%	6%	2%
64	A18	A30	A43	**73**	A17	A45	A13				
	20%	16%	11%		24%	23%	19%				
65	A30	A43	A18	**74**	A45	A68	A13				

Table 6 shows clearly that there is no competition over the first three ranks. If we take a detailed look at the ranks 4, 5 and 6 in Table 6, we observe interesting information on the competition. As such, A53 is a stronger candidate than A21 for 4th rank whereas A21 and A53 have the majority of votes for 5th and 6th ranks, respectively. This shows that A53 is better than A21 in sectors that will give it an advantage, but worse than A21 in other sectors that are relatively easier to develop. Similarly, A53 has a higher chance of moving up from 6th to 5th than dropping down A8's rank from 4th to 5th. Similar observations can be made upon the statistics given in Table 6. This information is important for cities in choosing the right competitors and consequently, determining the right strategies to implement.

Cities whose rank cannot be determined with the majority of votes are in a tight competition for superiority. It is difficult to determine their orientation as these cities have similar probabilities for a large number of ranks. For instance, let us consider the 10th and 16th ranks. There is a 4% difference between the three strongest candidates. It is unclear whether this difference is sufficient to differentiate in terms of the dominance of candidates. In this context, a superiority assessment cannot be made among the candidates, and it can be interpreted that each candidate has an equal chance.

Prioritizing Areas for Improvement

This section provides our results obtained using the methodology outlined in Subsection **Hata! Başvuru kaynağı bulunamadı.**. Here, we present Table 7 in which the most important three sectors are shown for each city. Note that the priorities are determined according to 2019 data. Also, A40 is not included in the given table since it is the best-performing city. We should also note that it is not realistic to boost the rank of the A7 by investing any of the sectors. Similarly, A41 can move up its rank only if it makes improvements in sectors C2 and C4. Further, the amount of improvement that should be done in C2 is lower than that of in C4 to move the rank of the A41 upwards.

Table 7. Priority of Cities

	Priority				Priority				Priority		
City	**1**	**2**	**3**	**City**	**1**	**2**	**3**	**City**	**1**	**2**	**3**
A7	C4	C1	C10	**A12**	C9	C2	C1	**A66**	C1	C8	C18
A41	C2	C4	C12	**A33**	C1	C9	C2	**A67**	C1	C9	C5
A8	C1	C9	C12	**A11**	C5	C2	C1	**A32**	C1	C2	C8
A21	C5	C9	C3	**A56**	C1	C5	C9	**A3**	C1	C2	C18
A53	C1	C18	C7	**A25**	C9	C18	C1	**A26**	C1	C2	C5
A1	C1	C18	C7	**A73**	C1	C5	C9	**A42**	C1	C9	C2
A58	C1	C18	C9	**A71**	C1	C8	C5	**A75**	C1	C5	C8
A52	C5	C8	C18	**A47**	C2	C18	C1	**A28**	C8	C18	C9
A59	C5	C7	C3	**A37**	C18	C8	C1	**A22**	C1	C2	C18

	Priority				Priority				Priority		
City	**1**	**2**	**3**	**City**	**1**	**2**	**3**	**City**	**1**	**2**	**3**
A55	C9	C1	C2	**A31**	C8	C18	C9	**A72**	C2	C8	C7
A24	C1	C9	C18	**A2**	C18	C8	C2	**A23**	C1	C2	C18
A29	C1	C2	C18	**A57**	C1	C8	C7	**A10**	C2	C8	C18
A50	C2	C1	C5	**A77**	C1	C9	C5	**A18**	C1	C8	C9
A19	C2	C1	C18	**A34**	C18	C7	C1	**A4**	C1	C2	C18
A49	C1	C18	C2	**A27**	C8	C18	C9	**A60**	C8	C7	C9
A54	C8	C18	C9	**A64**	C1	C8	C18	**A36**	C8	C18	C6
A63	C2	C1	C18	**A79**	C1	C9	C18	**A17**	C9	C1	C18
A5	C1	C2	C8	**A6**	C1	C5	C2	**A68**	C6	C18	C8
A20	C1	C18	C2	**A62**	C1	C12	C9	**A13**	C18	C8	C9
A46	C1	C18	C9	**A65**	C8	C18	C17	**A45**	C18	C6	C2
A70	C8	C2	C18	**A16**	C1	C17	C5	**A35**	C18	C1	C4
A39	C2	C1	C18	**A14**	C1	C2	C18	**A38**	C8	C18	C17
A78	C1	C8	C18	**A44**	C7	C18	C8	**A51**	C2	C1	C18
A80	C1	C2	C18	**A48**	C2	C8	C18	**A15**	C2	C5	C17
A81	C1	C18	C8	**A43**	C2	C17	C8	**A76**	C2	C9	C8
A74	C1	C5	C2	**A30**	C1	C8	C18	**A9**	C18	C8	C9
A61	C1	C2	C8	**A69**	C1	C8	C9				

When the priorities of cities and consensual ranking are evaluated together, it can be seen that their priorities differ. For instance, in Table 6, cities A52, A12 and A33 have similar probabilities on the 9th. However, the sectors with top priority are identified as C5, C9 and C1, respectively. This result shows that cities need improvements in different sectors, even if they show similar characteristics in terms of competition. These cities might lead all their effort to the same sector in order to gain competitional superiority by imitating each other without the knowledge of priority sectors. This would be futile since each city has different priorities.

The Past, The Present, and The Future Rank

Table 8 illustrates the rankings and scores of each city for three time periods. As mentioned earlier, the future ranking is obtained via basic time series analysis. The comparison between 2009 and 2019 shows that 38 cities have had an increase in their ranks whereas 32 cities have experienced dropping off to lower ranks. Also, 12 cities have preserved their position in the ranking list. Another observation is that the cities A5, A20 and A36 have dramatically increased their rank in ten years. This indicates that these three cities use their resources as best as possible and have made the right decisions. By similar logic, the change in ranking in 2025 provides information about the possible future rankings of cities when policies from the past 10 years are maintained. This is only to make the uncertain future a little predictable. It can also be used as a signal that the decision maker needs to change or maintain their current policies. Current policies can be insisted on if the decision maker's future position relative to the competitors determined in the previous stages is satisfactory. However, if the projection is depressing, it is a strong indicator of turning to new policies.

Table 8. The rank of cities in the past, the present and the future

	2009		2019		2025			2009		2019		2025	
City	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**	**City**	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**
A1	6	0,123	7↓	0,122	7↔	0,118	**A11**	13	0,080	15↓	0,071	15↔	0,067
A2	52	0,019	46↑	0,023	42↑	0,024	**A12**	10	0,088	12↓	0,079	11↑	0,075
A3	19	0,062	23↓	0,052	23↔	0,047	**A13**	70	0,007	72↓	0,006	73↓	0,006
A4	67	0,008	70↓	0,007	70↔	0,008	**A14**	61	0,013	60↑	0,013	57↑	0,015
A5	59	0,013	38↑	0,026	29↑	0,035	**A15**	79	0,002	79↔	0,003	78↑	0,004
A6	46	0,022	53↓	0,018	55↓	0,016	**A16**	58	0,014	61↓	0,013	58↑	0,014
A7	2	0,377	2↔	0,358	2↔	0,351	**A17**	77	0,005	73↑	0,006	72↑	0,007
A8	4	0,175	4↔	0,168	4↔	0,165	**A18**	68	0,008	67↑	0,009	66↑	0,010
A9	81	0,001	81↔	0,001	81↔	0,002	**A19**	34	0,033	39↓	0,026	40↓	0,025
A10	65	0,010	68↓	0,009	69↓	0,009	**A20**	47	0,022	32↑	0,031	31↑	0,034

	2009		2019		2025			2009		2019		2025	
City	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**	**City**	**Rank**	**Score**	**Rank**	**Score**	**Rank**	**Score**
A21	5	0,149	5↔	0,147	6↓	0,143	**A52**	12	0,082	9↑	0,088	8↑	0,089
A22	27	0,040	29↓	0,034	32↓	0,033	**A53**	7	0,121	6↑	0,139	5↑	0,155
A23	69	0,008	69↔	0,008	68↑	0,010	**A54**	32	0,035	36↓	0,028	38↓	0,026
A24	26	0,040	34↓	0,030	36↓	0,028	**A55**	36	0,031	28↑	0,034	27↑	0,037
A25	16	0,068	13↑	0,074	16↓	0,067	**A56**	15	0,070	14↑	0,071	13↑	0,069
A26	25	0,044	22↑	0,053	20↑	0,057	**A57**	48	0,022	49↓	0,020	47↑	0,021
A27	51	0,020	54↓	0,017	56↓	0,016	**A58**	8	0,105	8↔	0,091	9↓	0,088
A28	21	0,060	25↓	0,048	26↓	0,038	**A59**	9	0,091	11↓	0,080	12↓	0,075
A29	39	0,028	33↑	0,031	30↑	0,034	**A60**	72	0,006	71↑	0,006	71↔	0,007
A30	63	0,012	66↓	0,009	67↓	0,010	**A61**	44	0,024	45↓	0,023	44↑	0,023
A31	42	0,025	48↓	0,021	48↔	0,020	**A62**	57	0,016	55↑	0,016	53↑	0,018
A32	18	0,065	24↓	0,049	24↔	0,044	**A63**	37	0,029	35↑	0,028	34↑	0,029
A33	14	0,071	10↑	0,084	10↔	0,084	**A64**	53	0,018	51↑	0,018	50↑	0,018
A34	50	0,020	52↓	0,018	52↔	0,018	**A65**	54	0,018	57↓	0,015	59↓	0,014
A35	76	0,005	78↓	0,003	79↓	0,004	**A66**	17	0,066	21↓	0,056	22↓	0,053
A36	73	0,006	62↑	0,010	62↔	0,011	**A67**	23	0,058	20↑	0,056	21↓	0,055
A37	20	0,060	19↑	0,060	18↑	0,062	**A68**	74	0,006	75↓	0,005	74↑	0,006
A38	75	0,005	77↓	0,004	77↔	0,004	**A69**	66	0,010	64↑	0,010	65↓	0,010
A39	45	0,024	43↑	0,024	37↑	0,026	**A70**	41	0,026	41↔	0,024	39↑	0,026
A40	1	0,997	1↔	0,967	1↔	0,935	**A71**	24	0,057	17↑	0,066	14↑	0,068
A41	3	0,272	3↔	0,243	3↔	0,231	**A72**	64	0,011	65↓	0,010	63↑	0,011
A42	30	0,038	26↑	0,041	25↑	0,043	**A73**	11	0,085	16↓	0,068	19↓	0,061
A43	62	0,012	63↓	0,010	64↓	0,011	**A74**	40	0,026	44↓	0,023	45↓	0,022
A44	60	0,013	59↑	0,013	60↓	0,013	**A75**	28	0,039	27↑	0,037	28↓	0,037
A45	71	0,007	74↓	0,005	76↓	0,005	**A76**	80	0,002	80↔	0,002	80↔	0,003
A46	43	0,024	42↑	0,024	43↓	0,024	**A77**	49	0,021	50↓	0,018	49↑	0,019
A47	22	0,059	18↑	0,062	17↑	0,063	**A78**	38	0,028	40↓	0,025	41↓	0,025
A48	55	0,017	58↓	0,013	61↓	0,012	**A79**	56	0,017	56↔	0,016	54↑	0,018
A49	29	0,038	30↓	0,033	35↓	0,028	**A80**	33	0,035	37↓	0,027	46↓	0,022
A50	35	0,032	31↑	0,033	33↓	0,030	**A81**	31	0,036	47↓	0,022	51↓	0,018
A51	78	0,003	76↑	0,004	75↑	0,005							

Interaction of Outputs

While each output of the proposed approach provides important managerial information by itself, they also complement each other. Output 1 provides consistent rankings of cities and identification of cities where they are competing for a rank. However, it does not provide an information on which sectors the corresponding city should concentrate to gain a competitive advantage. Output 2 addresses this need and reveals which sectors the cities should prioritize to be able to take place in higher ranks over their competitors. However, in some cases, the city's normal development momentum can naturally have the power to move the city to the next rank. Output 3 gives the answer to whether the city can rise to a higher rank without making any extra effort. This information is also important for the effective use of resources. The interaction of outputs allows the decision-maker to see the big picture and set detailed and coherent policies.

Conclusion

Benchmarking, which is an effective managerial tool, is widely used in strategic decision processes. In the tough competitive environment between cities, policymakers often prefer the benchmarking method primarily for self-criticism purposes. The benchmarking literature has focused on identifying benchmarks and developing methods to measure benchmark scores. However, the proposed methods are insufficient to provide the necessary information regarding with the objective ranking results, identify priority areas, and develop future policies. This study proposes a methodological approach to fill the highlighted gap.

The proposed methodology is based on the parameter sensitivity of the multi-criteria decision-making techniques and has the flexibility to be adapted to different decision environments such as uncertain data and multiple decision-makers. It provides three main outcomes. The first is to obtain a consistent ranking. The ranking is simulated with different weight sets to obtain a ranking that would be satisfactory to decision-makers with different perspectives. In this way, it is possible to render the information about each city belonging to which ranking with what probability. The weight simulation approach adopted in obtaining this output is an important technical contribution of our study. This approach can be used effectively in ranking problems where a dominant order cannot be allocated among the criteria or where all views are required to be included in the evaluation. In particular, in studies that focus on policymaking, the knowledge of the alternatives belong to which rank and what probability constitutes a strong basis for producing consistent policies.

The second is the determination of priority areas in order to reach a better ranking. The performance of each city on each criterion is increased until the ranking of the city changes, while all other elements of the decision matrix are kept constant. In this way, it is determined how much increase is required for which criterion to change the city’s ranking. The descending order of the criteria's increasing requirement presents the city's priority order.

The third is to evaluate the consequences of previous policies and predict the city's possible future ranking if the same policies are continued. Applied policies are analyzed by ranking changes of cities in a certain period range. In the case of the continuation of the same policies, criterion performances are estimated to analyze the change in the ranking of the city. The predicted ranking gives information about the future ranking of cities if the same policies are put into practice.

The proposed methodology was implemented with a case study. Each outcome of the methodology has been examined in detail over the case, consisting of 81 cities and 18 criteria. The findings show that the methodology offers far more information than simply ranking pure benchmarking scores. Also, the findings obtained through sensitivity analysis are a comprehensive guide for cities to plan their future and focus their efforts on the right sectors.

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Appendix

Table 9. Cities of Turkey

City Code	City Name	City Code	City Name	City Code	City Name	City Code	City Name
A1	Adana	A21	Bursa	A42	Kahramanmaraş	A62	Niğde
A2	Adıyaman	A22	Çanakkale			A63	Ordu
A3	Afyonkarahisar	A23	Çankırı	A43	Karabük	A64	Osmaniye
		A24	Çorum	A44	Karaman	A65	Rize
A4	Ağrı	A25	Denizli	A45	Kars	A66	Sakarya
A5	Aksaray	A26	Diyarbakır	A46	Kastamonu	A67	Samsun
A6	Amasya	A27	Düzce	A47	Kayseri	A68	Siirt
A7	Ankara	A28	Edirne	A48	Kırıkkale	A69	Sinop
A8	Antalya	A29	Elazığ	A49	Kırklareli	A70	Sivas
A9	Ardahan	A30	Erzincan	A50	Kırşehir	A71	Şanlıurfa
A10	Artvin	A31	Erzurum	A51	Kilis	A72	Şırnak
A11	Aydın	A32	Eskişehir	A52	Kocaeli	A73	Tekirdağ
A12	Balıkesir	A33	Gaziantep	A53	Konya	A74	Tokat
A13	Bartın	A34	Giresun	A54	Kütahya	A75	Trabzon
A14	Batman	A35	Gümüşhane	A55	Malatya	A76	Tunceli
A15	Bayburt	A36	Hakkari	A56	Manisa	A77	Uşak
A16	Bilecik	A37	Hatay	A57	Mardin	A78	Van
A17	Bingöl	A38	Iğdır	A58	Mersin	A79	Yalova
A18	Bitlis	A39	Isparta	A59	Muğla	A80	Yozgat
A19	Bolu	A40	İstanbul	A60	Muş	A81	Zonguldak
A20	Burdur	A41	İzmir	A61	Nevşehir		