



RESEARCH ARTICLE

Determining the Criteria Weights in the Green Restaurant Selection Process Using the SWARA Method

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ARTICLE INFO	ABSTRACT
Received: Oct 13, 2024	This study aims to examine the impact of sustainability-driven green restaurants on consumer preferences. The rationale behind the study is to understand how businesses that undertake environmental responsibilities influence consumer behavior. Accordingly, in July 2023, expert interviews and a Multi-Criteria Decision-Making (MCDM) analysis were conducted using the SWARA method. Methodologically, the use of the SWARA technique identified key criteria affecting consumers' selection of green restaurants, including hygiene, price, and environmental sensitivity. Results indicate that consumers' sensitivity toward sustainability plays a significant role in their restaurant choices. The research guides businesses in comprehending the core aspects of the green restaurant concept, while also highlighting that the spread of such eco-friendly practices can contribute to sustainable tourism and social awareness. These findings provide strategic insights for policymakers and business managers aiming to enhance consumer awareness and environmental sensitivity.
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INTRODUCTION

Humanity's increasing and evolving needs have accelerated the transformation of the food and beverage industry, bringing with them a series of problems. Among these issues are the destruction of natural resources, uneven food distribution, irresponsible resource use, and food waste. In this context, the damage to food sources, excessive consumption, and irresponsible usage have led to severe consequences, such as the use of harmful chemicals, increased waste and its environmental impact, and water source pollution (Erik & Pekerşen, 2019; Kırmızıkuşak & Yücel, 2021).

The growing importance of environmental awareness and sustainability concepts at the societal and policy levels is guiding businesses towards adopting eco-friendly policies. Especially in the food and beverage sector, the development of green practices by restaurants has a significant impact on cost

management, market competition, and environmental protection activities. Food and beverage businesses often overlook environmental sensitivity and sustainable practices. However, businesses that are environmentally conscious can adopt sustainable policies in their management processes to gain a competitive advantage. It should also be noted that businesses failing to implement such policies may miss opportunities to enhance customer awareness and positively impact customer satisfaction and demand (Ismael & Keskin, 2021).

Determining the weight of criteria in the selection process of green restaurants is crucial for sustainable tourism practices. In an era of increased environmental awareness, consumers' tendencies to consider sustainability criteria in their restaurant choices have risen. However, there is a gap in the literature regarding which criteria are prioritized and how they should be evaluated. While existing studies generally focus on the definition and overall benefits of green restaurants, there is limited literature on determining and weighting the criteria used in the selection process. This study aims to determine the weights of criteria in the green restaurant selection process using the SWARA (Step-wise Weight Assessment Ratio Analysis) method. The SWARA method allows for the systematic evaluation of subjective expert opinions and thus contributes to the objective comparison of restaurants' sustainability performances (Keshavarz Ghorabae et al., 2023). In this context, the research offers significant contributions both to the academic literature and to practical applications in the tourism sector.

In recent years, eco-friendly practices in businesses have become a preference for some consumers. In this regard, identifying the preferred practices in green restaurants is important for guiding the sector. Determining which green practices are more valuable to customers can guide businesses in taking necessary measures. Consequently, investigating the importance customers place on green practices can provide strategic insights for recommending improvements and increasing demand for green restaurants. Given that consumer environmental awareness and sustainability concepts encourage businesses to adopt eco-friendly policies, there is a need to enhance the development of green restaurants and the importance of green practices. Therefore, this study aims to examine the motivations behind consumers' preferences for green restaurants and identify which criteria are most important in choosing green restaurants. To achieve this, interviews were conducted with a panel of five experts in the tourism field, and the importance levels of the criteria were determined using Multi-Criteria Decision Making (MCDM) methods. The issue addressed by the research is the lack of clear determination of the weights of criteria used in the selection of green restaurants in the existing literature. There is uncertainty regarding which criteria are prioritized and how they should be weighted. This uncertainty may negatively impact the decision-making processes of both consumers and operators. Therefore, the aim of this study is to fill this gap and develop a better understanding both theoretically and practically.

The Concept of Green Generation Restaurants

The concept of sustainability, according to the World Commission on Environment and Development's "Our Common Future" report, is recognized as a development model that prevents the wastefulness of natural resources and values through rational approaches to their protection and support. This understanding emphasizes the sustainable use of resources and their transfer to future generations, as highlighted by Li and Xu (2019). The primary goal of sustainability, as expressed by Holden et al. (2017), is to preserve cultural integrity, economic processes, and biodiversity. This requires the balanced use of natural resources and their transfer to future generations. Additionally, the goal of sustainability includes reducing factors that threaten essential life activities such as ensuring intergenerational equity in consumption opportunities and eliminating hunger and thirst (Falágan & Terry, 2018). In this context, sustainability efforts can also be associated with social and economic factors, such as increasing the accessibility of quality urbanization, education, and healthcare services. For instance, sustainable urban planning can provide both environmental and

social benefits by ensuring the effective use of natural resources. Similarly, sustainability goals aim to enhance societal welfare by increasing the accessibility of education and healthcare services.

This situation highlights the increasing importance of the concept of carbon footprint. The carbon footprint refers to the amount of greenhouse gases, particularly carbon dioxide, released into the atmosphere as a result of the vital activities of individuals, countries, or organizations (Plassmann, Edwards, & Jones, 2010). In this context, sustainability and carbon footprint concepts can be considered intertwined and closely related. Examining the effectiveness of sustainability practices through carbon footprint tracking shows that the impact of restaurant operations in this area is significant (Taş & Olum, 2020). Restaurants can significantly increase or decrease their environmental impact through factors such as energy consumption, waste management, and supply chain operations. The restaurant industry, in particular, has the potential to contribute to greenhouse gas emissions both directly and indirectly. Factors such as food production, processing, transportation, energy consumption, and waste management can significantly affect a restaurant's carbon footprint. Therefore, the sustainability practices of restaurant businesses are of great importance both environmentally and socially. This issue has increasingly attracted the attention of individuals and businesses. Particularly in sectors with high resource consumption and waste output, such as gastronomy and the food and beverage industry, achieving sustainability is becoming increasingly important (Jang, Kim, & Bonn, 2011). In this context, supporting the conscious use of resources, ensuring recycling, and considering environmental factors in the production process enhances the importance of transitioning to green restaurant practices.

Green restaurants play a significant role in environmental sustainability. According to Lorenzini (1994), these businesses are described as buildings constructed or renovated using energy-efficient and environmentally friendly methods. This definition provides an important framework for reducing the environmental impact of restaurants and adopting sustainability principles. Green restaurants aim to minimize their environmental negative impacts through various methods. These include reduction, reuse, recycling, energy, and efficiency (Gilg, Barr, & Ford, 2005). These practices aim to protect natural resources, achieve economic gains, and meet increasing consumer demands. To this end, green restaurants focus on various strategies, including the use of renewable energy sources, preference for recyclable materials, use of organic products, water conservation, and waste reduction methods.

The adoption of an environmentally and economically sustainable approach by green restaurants aligns with the goal of providing solutions to environmental issues. These businesses are aware of being part of a society that recognizes environmental problems and aims to take responsibility for them (Keşkekci & Gencer, 2023). Therefore, green restaurants aim to improve their operational performance while helping society achieve sustainability goals by reducing their environmental impact and adopting sustainable practices. The Green Generation Restaurant Movement is a certification program conducted in Turkey. Coordinated by Boğaziçi University and WWF-Turkey, and supported by TURYİD and the Beşiktaş Municipality, this program is based in Istanbul. To be included in the Green Generation Restaurant Program, certain stages must be completed. These stages are based on seven core topics: energy use, water use, waste management, reduction of chemical use, sustainable food, sustainable furniture and building materials, communication, and training (Şimşek & Akdağ, 2017; İpar, Babaç, & Kök, 2020).

Reasons for Choosing Green Restaurants

The impact of green restaurants on consumer preferences has been explored through various studies, revealing different perspectives. A study by İpar, Babaç, and Kök (2020) indicates that some customers have expectations from green restaurants related to elements such as taste, service quality, music, hygiene, design, and menu themes. These expectations are significant factors that

shape the customer experience, and the performance of green restaurants in these areas can effectively influence consumer preferences.

Research has also shown that the intention to experience businesses with eco-friendly practices is positive, and there is an increased tendency to share this experience with others (Hilaloğulları, Akdağ, & Üzülmöz, 2022). This suggests that green restaurants can not only enhance customer satisfaction but also increase environmental awareness.

Another study by Han and Back (2006) found that consumers are satisfied with the products offered by green restaurants and are willing to pay a premium for these products. These results indicate that the products provided by green restaurants create a positive perception among consumers and thus lead to their preference.

Consumers who choose green restaurants value not only the quality of the products but also the presence of eco-friendly practices (Kim, 2008). According to Eren (2018), these consumers are sensitive to the production and consumption processes of products and prefer businesses that minimize harmful environmental impacts.

Moreover, it is observed that consumers who prefer green-qualified restaurants are concerned not only about environmental issues but also about health and nutrition (Hughner et al., 2007; Fillion & Arazı, 2002). Additionally, there is a growing awareness regarding environmental issues such as recycling, energy, and water efficiency (Kim, 2002).

Lastly, it is noted that green restaurant programs have not yet received the desired level of attention (Şahingöz & Güleç, 2019). However, research by Kwok, Huang, and Hu (2016) shows that customers are willing to pay more and travel longer distances to patronize green restaurants, especially those that adopt eco-friendly principles. This indicates that green restaurants can not only reduce their environmental impact but also provide economic benefits to their businesses.

Application of SWARA

In this study, the SWARA (Step-wise Weight Assessment Ratio Analysis) technique, a Multi-Criteria Decision-Making (MCDM) method, was utilized. SWARA, introduced to the literature in 2010 by Keršulienė and colleagues, is an MCDM method based on expert assessments and has been applied in various fields (Keršulienė et al., 2010).

Experts determine the importance of each criterion based on their knowledge and experience using the SWARA method and then rank all the criteria from the first to the last. This ranking process is completed such that the most important criterion is placed first and the least important criterion is placed last (Keršulienė & Turksis, 2011). In the process of determining criterion weights, the ability of expert opinions to estimate the importance of the criteria is considered a fundamental element of the SWARA method (Aghdaie et al., 2013). Compared to other methods, the SWARA method requires fewer pairwise comparisons to solve decision problems involving a large number of criteria. For an n -criteria decision problem, $n-1$ comparisons are deemed sufficient (Stanujkic et al., 2015).

The steps of the SWARA method are as follows:

Identification of Criteria: The criteria to be used in the decision-making process are identified.

Ranking of Criteria by Importance: Experts determine the importance of each criterion based on their knowledge and experience and rank these criteria in order of importance.

Weight Assignment: Each criterion is assigned a weight based on its rank in the order. The most important criterion receives the highest weight, while the least important criterion receives the lowest weight. The relevant calculation is performed using the equation shown below.

$$k_j = \begin{cases} 1 & j=1 \\ s_j+1 & j>1 \end{cases} \quad (1)$$

4. *Performing Pairwise Comparisons:* Pairwise comparisons are conducted among the criteria, and the preference and importance vector between the criteria is determined for each comparison. The relevant calculation is performed using the equation shown below.

$$w_j = \begin{cases} 1 & j=1 \\ \frac{x_{j-1}}{k_j} & j>1 \end{cases} \quad (2)$$

5. *Calculation of Weight Values:* Based on the results of the pairwise comparisons, the final weight values for each criterion are calculated. The relevant calculation is performed using the equation shown below.

$$q_j = \frac{w_j}{\sum_{k=1}^n w_k}$$

(3)

qj: Weight of the jjj-th criterion,

nnn: Total number of criteria,

wijw_{ij}w_{ij}: Weight assigned to the iii-th criterion in comparison with the jjj-th criterion.

This equation indicates that the weight of each criterion is calculated as the average of the weights obtained from comparisons with all other criteria. This calculation is used to determine the relative importance of each criterion.

6. *Evaluation of Results:* Using the obtained weight values, the alternatives in the decision-making process are evaluated, and the most suitable option is determined. These steps explain the fundamental workings of the SWARA method and the steps involved in the decision-making process.

METHOD

The criteria affecting the selection of green restaurants examined in this study are adapted from the work of Kurnaz and Özdoğan (2017). The nine criteria included in this study were evaluated by a panel of five expert decision-makers who are faculty members involved in investments and research in the field of tourism. The objectives of the study were first conveyed to the decision-making group, and information regarding the implementation process was provided. The experts were asked to rank the importance of the criteria believed to influence consumers' preference for green restaurants and to specify the importance weights (sjs_jsj) for these criteria. The criteria provided to the decision-makers for evaluation are shown in Table 1:

Table 1. Criteria and Abbreviations

Recommendation	REC
Quality	QUA
Price	PRC
Hygiene	HYG
Staff Attention	SA
Advertising	ADV
Atmosphere	ATM
Environmental Sensitivity	ES
Other	OTH

Table 1 presents the criteria ranked by the Decision Makers, who were then assigned relative importance weights (sj) based on their significance levels. Following this, the SWARA method was applied. The expert group for the study consisted of 5 individuals, which is deemed sufficient for expert evaluation in AHP methods. SWARA is a technique used in situations where decision-makers do not reach consensus or are required to evaluate areas outside their expertise. It allows experts to easily assess and compare based on their own opinions and experiences rather than a fixed scale (Gencer & Eroğlu, 2020). The experts are coded as Decision Makers in the tables. Each decision maker evaluated the 9 criteria listed in Table 1.

RESULTS AND DISCUSSION

With this explanation, the SWARA application steps began. The decision makers ranked the 9 criteria affecting the preference for green restaurants according to their experiences and thoughts, performing pairwise comparisons. According to the SWARA method, pairwise comparisons were always made with the next criterion. For example, Decision Maker 1 (DM1) ranked Environmental Sensitivity (ENV) as the most important criterion and Quality (QLT) as the second most important criterion. The importance (sj) assessment and comparison were applied between these two criteria. If the importance difference between ENV and QLT was evaluated as 0.10, the SWARA procedure considers that the ENV criterion is 10% more important than the QLT criterion. The specified rankings and relative importance scores are provided in Table 2.

Table 2. Ranking of Criteria and Relative Importance Scores

	CR1		CR 2		CR 3		CR 4		CR 5	
	Criterion	sj	Criterion	sj	Criterion	sj	Criterion	sj	Criterion	sj
1	ÇEV		KAL		HYG		ÇEV		HYG	
2	QUA	0,10	ÇEV	0,20	PRC	0,15	HYG	0,25	PRC	0,15
3	PRC	0,15	HYG	0,20	ÇEV	0,25	PRC	0,10	KAL	0,25
4	SA	0,25	ADV	0,10	SA	0,20	QUA	0,15	ÇEV	0,20
5	HYG	0,05	PRC	0,50	REC	0,10	REC	0,10	ADV	0,10
6	ADV	0,10	REC	0,20	ADV	0,15	ATM	0,25	ATM	0,15
7	REC	0,40	ATM	0,20	ATM	0,25	SA	0,10	SA	0,60
8	ATM	0,25	SA	0,10	QUA	0,50	ADV	0,40	OTH	0,20
9	OTH	0,15	OTH	0,10	OTH	0,10	OTH	0,10	REC	0,10

In Table 2, the criterion rankings and relative importance scores were calculated using Equality 1. The coefficient values (Importance Vector) (kj) for each decision maker are shown in Table 3.

Table 3. Calculation of Coefficient Values

	CR1		CR 2		CR 3		CR 4		CR 5	
	Criterion	kj	Criterion	kj	Criterion	kj	Criterion	kj	Criterion	kj
1	ÇEV	1,00	KAL	1,00	HYG	1,0	ÇEV	1,00	HYG	1,00
2	QUA	1,10	ÇEV	1,20	PRC	1,2	HYG	1,25	PRC	1,15
3	PRC	1,15	HYG	1,20	ÇEV	1,3	PRC	1,10	KAL	1,25
4	SA	1,25	ADV	1,10	SA	1,2	QUA	1,15	ÇEV	1,20
5	HYG	1,05	PRC	1,50	REC	1,1	REC	1,10	ADV	1,10
6	ADV	1,10	REC	1,20	ADV	1,2	ATM	1,25	ATM	1,15
7	REC	1,40	ATM	1,20	ATM	1,3	SA	1,10	SA	1,60
8	ATM	1,25	SA	1,10	QUA	1,5	ADV	1,40	OTH	1,20
9	OTH	1,15	OTH	1,10	OTH	1,1	OTH	1,10	REC	1,10

In Table 3, the coefficient values (Importance Vector) (kj) were calculated using Equality 2. The weights for each decision maker were then adjusted, and the results of these adjustments are provided in Table 4.

Table 4. Adjusted Weights (Qj Values)

	CR1		CR 2		CR 3		CR 4		CR 5	
	Criterion	kj	Criterion	kj	Criterion	kj	Criterion	kj	Criterion	kj
1	ÇEV	1,000	KAL	1,000	HYG	1,000	ÇEV	1,000	HYG	1,000
2	QUA	0,909	ÇEV	0,833	PRC	0,870	HYG	0,800	PRC	0,870
3	PRC	0,791	HYG	0,694	ÇEV	0,696	PRC	0,727	KAL	0,696
4	SA	0,632	ADV	0,631	SA	0,580	QUA	0,632	ÇEV	0,580
5	HYG	0,602	PRC	0,421	REC	0,527	REC	0,575	ADV	0,527
6	ADV	0,548	REC	0,351	ADV	0,458	ATM	0,460	ATM	0,458
7	REC	0,391	ATM	0,292	ATM	0,367	SA	0,418	SA	0,286
8	ATM	0,313	SA	0,266	QUA	0,244	ADV	0,299	OTH	0,239
9	OTH	0,272	OTH	0,242	OTH	0,222	OTH	0,272	REC	0,217

According to Table 4, the selections of DM3 can be exemplified as follows: The Qj value for the Hygiene criterion is 1 according to Equality (3). For DM2, the Qj value for Hygiene is calculated as $0.833/1.2 = 0.694$ according to Equality (2). In the final processing stage of the method, relative criterion weights for each decision maker were calculated using Equality (3). The computed values are presented in Table 5.

Table 5. Relative Weights

	CR1		CR 2		CR 3		CR 4		CR 5	
	Criterion	Wj	Criterion	Wj	Criterion	Wj	Criterion	Wj	Criterion	Wj
1	ÇEV	0,183	KAL	0,211	HYG	0,201	ÇEV	0,193	HYG	0,205
2	QUA	0,167	ÇEV	0,176	PRC	0,175	HYG	0,154	PRC	0,178
3	RC	0,145	HYG	0,147	ÇEV	0,140	PRC	0,140	KAL	0,143
4	SA	0,116	ADV	0,133	SA	0,117	QUA	0,122	ÇEV	0,119
5	HYG	0,110	PRC	0,089	REC	0,106	REC	0,111	ADV	0,108

6	ADV	0,100	REC	0,074	ADV	0,092	ATM	0,089	ATM	0,094
7	REC	0,072	ATM	0,062	ATM	0,074	SA	0,081	SA	0,059
8	ATM	0,057	SA	0,056	QUA	0,049	ADV	0,058	OTH	0,049
9	OTH	0,050	OTH	0,051	OTH	0,045	OTH	0,052	REC	0,045

In Table 5, Equality 3 was used to calculate the final weights of the criteria (W_j). Subsequently, the geometric mean of the relative weights obtained from the decision makers' evaluations was computed to determine the final weights. The final weights are presented in Table 6.

Table 6. Final Weights

Criterion	Geometric Mean	Arrangement
Environmental Sensitivity	0,134	3
Quality	0,125	4
Price	0,141	2
Hygiene	0,160	1
Staff Attention	0,082	7
Advertising	0,095	5
Atmosphere	0,074	8
Employee Attention	0,094	6
Other	0,049	9

Table 6 displays the results obtained using the SWARA method. According to the table, the importance levels of the criteria are ranked as follows: Hygiene > Price > Environmental Sensitivity > Quality > Advertising > Recommendation > Employee Attention > Atmosphere > Other. The results of the geometric mean calculations are illustrated in Figure 1.

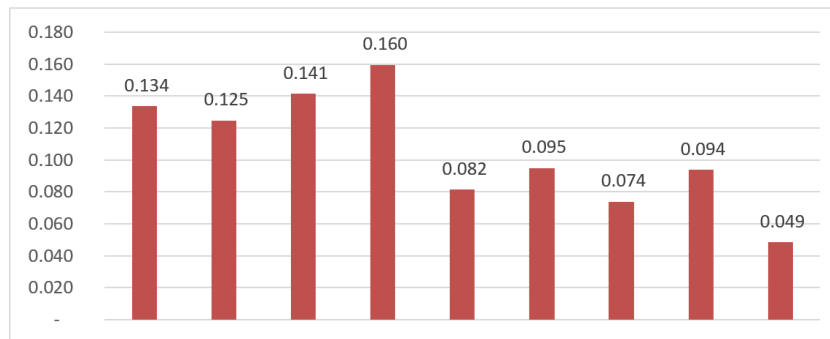


Figure 1. Geometric Mean Results Obtained Using the SWARA Method

As shown in Figure 1, the averages and importance levels of the criteria can be observed more clearly.

CONCLUSION

This study aimed to identify the factors most influencing consumers' choices of green restaurants, employing the SWARA method, which is one of the Multi-Criteria Decision-Making (MCDM) methods. SWARA allows experts to determine the importance levels of evaluation criteria in the decision-making process, and the importance levels assigned by experts play a decisive role in this method. Therefore, a group of 5 faculty members with investments in the tourism sector was consulted to benefit from their insights. The experts were provided with information on the topic and asked to determine the importance levels of criteria affecting consumers' preferences for green restaurants.

During the study, the criteria mentioned by Kurnaz and Özdoğan (2017) on factors influencing green restaurant selection were presented to the consulted experts, who were then asked to rank these

criteria according to their importance levels. The responses provided by the experts were analyzed using the SWARA method, which is part of MCDM techniques.

The analysis revealed that, according to the experts' opinions, the most important criterion for consumers in the selection process of green restaurants is Hygiene. This finding aligns with Örgün's (2023) study on local restaurant selection, which identified hygiene, price, and food quality as the most influential criteria. Despite the different themes of the restaurants studied, the similar results suggest that high expectations for hygiene may be influenced by recent increases in infectious diseases and foodborne illnesses. Businesses in the food and beverage sector could gain a competitive advantage by elevating their cleanliness and hygiene standards to the highest levels.

On the other hand, the green restaurant concept, which has been in place since 2014, has not yet achieved the desired level of adoption, indicating a lack of sufficient initiatives in this area (İpar, Babaç, & Kök, 2020). One of the main reasons for this is likely the high cost burden faced by businesses (Yazıcıoğlu & Aydın, 2018). Addressing these cost concerns through incentives from ministries and local governments is feasible. Additionally, academics can guide businesses by conducting studies aimed at reducing the costs associated with green restaurants.

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