

Article

Performance Evaluation of Green Furniture Brands in the Marketing 4.0 Period: An Integrated MCDM Approach

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Abstract: This study aims to develop a framework that enables green marketing practices to regulate the performance evaluation criteria (GFBPC) of consumers and green furniture brands in the Marketing 4.0 period and to prioritize green furniture brands. The first stage was the literature review and decision-making group; it included GFBPC and the selection of three green furniture brands with the highest market value in Turkey. We then applied AHP to determine and prioritize benchmark weights, and TOPSIS to rank the performances of selected brands by GFBPC. We performed SA to test the accuracy of the findings. The results revealed that the Co-creation of Value and Pricing criteria have the highest value, and “Brand Y” is the best. Among the evaluation contributions of the study are a new understanding of green furniture performance criteria, and an integrated framework for new application methods for green marketing. With the Marketing 4.0 period, it is among the first of its kind to offer sustainable solutions to evaluate green marketing practices and increase the performance of green furniture brands in this regard. The results can help furniture industry stakeholders understand ways to compete in the green market and sustainable development.

Keywords: sustainable development; green marketing; Marketing 4.0; brand performance; green furniture



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1. Introduction

Although there are studies on green production in the literature, there are few studies that select the green brand with the best performance in the competitive environment [1,2]. The number of studies conducted to determine the consumer-oriented green furniture performance evaluation criteria is not sufficient [3]. However, green furniture brands that strive for green and sustainable production and that offer furniture used in millions of living spaces to the market can improve themselves based on these criteria if they know according to which criteria their performance is evaluated by consumers [1]. In addition, they can compare themselves with other competing green furniture brands according to these criteria. The facts that these criteria are not known either in the literature or in practice and that the brands that produce green furniture in the market do not know at what level they are compared to their competitors, and according to which scale they will be evaluated, are the problems which encouraged us to do this study.

Green, clean, and sustainable production and consumption are at the fore of today’s prevalent future problems [4]. Global measures are taken to address these problems. A great deal of work falls particularly on all industries that contribute to the country’s economy. In these environmentally conscious industries, the brands that, as a concept, have the following meaning, “sometimes a name, a term, a sign, a symbol, a design, or a combination of all these, created by a seller to describe and differentiate their goods and services” [5,6], make great investments in raising awareness and influencing society. Brands, which are rapidly progressing towards greening their production and marketing strategies, are now competing in green markets where the environmental concerns of

consumers are taken into consideration, and where green products, which are made from recycled materials, are longer-lasting and healthy, are reusable after consumption, and have less harmful packaging, are offered to consumers. To distinguish themselves from their competitors and to generate more sales, they receive consultancy from environmental experts and statistical companies that research the consumers' environmental concerns [7].

With the increase in green furniture production and consumption in the country, various benefits such as minimizing carbon emissions and preventing environmental damage will also facilitate the transition of the green furniture industry to the bioeconomy. Green marketing strategies can be advised as the most practical way of transitioning to green products. Recent research has conducted studies that consider environmental concerns such as green marketing strategies, sustainable production and consumption, and sustainable investments. These studies present recommendations to brands to offer products and services that take into consideration the consumers' environmental concerns and constantly improve themselves on the path of sustainable living [8]. Stated in other words, research on green products provides suggestions for brands regarding understanding, comprehending, and implementing green marketing strategies that spread the awareness of environmental responsibility to all company stakeholders [9,10].

One of the important subjects in the improvement and facilitation of green marketing is the widespread use of the Internet. Specifically, Industry 4.0 has paved the way for green marketing. At the same time, Industry 4.0 also initiated the Marketing 4.0 period. The focus points of the Marketing 4.0 period are consumer emotions, intentions, perceptions, and behaviors. Considering the increasing environmental concerns at the global level, in literature, it is advised for brands in all industries to utilize green marketing strategies to produce and market products for consumers who have a perception and behavior in this direction. Consumers' intentions to buy green products may be an outcome of environmental concerns. The capability of brands to appeal to consumers who want to buy green products and raise awareness of green products among more customers depends on the steps they will take in this direction.

Developments including Turkey's sustainable development map, environmental awareness of consumers, consumer willingness to pay more for green products, etc. have all paved the way for green marketing strategies for Turkish furniture brands. We can spin the wheel of sustainable development with the transition to green marketing. Green marketing has an impact on strengthening brand performance. Green marketing has a positive effect on brand knowledge. Brand knowledge acts as a moderator between green marketing and brand performance. As a result, green marketing strategies have an affirmative and positive effect on brand performance [11,12].

The reason that encouraged us to carry out this study for Turkey is the record growth in furniture exports, especially after the COVID-19 pandemic, according to the TUIK (Turkish Statistical Institute) report [13]. The success of the Turkish furniture industry after this period, when environmental and health concerns reached their maximum level, is mainly due to the high export returns of the three brands determined by our expert group in the study. According to MEA (Mediterranean Exporters' Associations) report data from industry, automotive, construction, furniture, etc. sectors, Turkey's share in world furniture exports in 2022, when compared to the year 2021, increased by 29.7% and reached 752 million 861 thousand\$ dollars [14]. We believed it would be beneficial to conduct research on green furniture brands in the Marketing 4.0 period we are currently in, to increase this small stake in the sector. In this context, the methodology of our research was conducted in many detailed stages.

We used an Integrated Multi-Criteria Decision-Making model (MCDM), which gives accurate and reliable results in optimizing decision-making problems [15]. In MCDM techniques, the evaluations of decision-makers are very significant [16,17]. To reach accurate results, by accepting that our expert decision-making group, consisting of academicians who are experts in the field of Marketing 4.0, brand performance, and green marketing, will make the most accurate assessment with their experience and academic knowledge,

according to green furniture brand performance criteria (GFBPC) determined by our decision-making group, we have taken into account Turkey's three leading brands in terms of import and export sales turnover, which have partially switched to green furniture production and which are close to each other in terms of product prices, sales turnover, communication with consumers, and adding value to society (Brand X, Brand Y, Brand Z). With the GFBPC determined by the decision-making group, we pursued answers to two questions for three green furniture brands.

1. What are the weights of the green furniture brand's performance evaluation criteria (GFBPC) in the Marketing 4.0 period?
2. According to GFBPCs, what is the performance ranking of the three green furniture brands with the highest market value in Turkey?

To give answers to these questions, firstly we adjusted a hybrid model for our study. This hybrid model is commonly used to encourage optimal solutions, grade alternatives against criteria, and evaluate the priorities of all criteria [18,19].

We found a solution to the first question with AHP (Analytical Hierarchy Process). AHP, which dates back to the 1980s, and is one of the trend methods because it is flexible to changing conditions. Since its development, AHP has had numerous applications and has been applied to numerous types of decision problems [20,21]. AHP represents a heuristic and easy method for formulating and analyzing decisions [22].

We approached the second question with TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). TOPSIS is used for ranking problems of potential alternative solutions. TOPSIS is obtained by evaluating a set of criteria elements and sub-criteria elements through pairwise comparison [23].

Finally, we used sensitivity analysis (SA) for validation of the AHP and TOPSIS results.

Thus, in our study, we aim to provide performance-enhancing methods and practices of exemplary green furniture brands so that Turkish green furniture brands can switch to green production in more categories, to raise awareness among unaware consumers by explaining the reasons why they should not avoid green production even if it is more expensive, and to create a perception among consumers with ambitious purposes such as "acting for a more sustainable and greener world".

Our study aims to make important contributions to the literature in the fields of green marketing, green furniture brand performance, and Marketing 4.0. First, the literature lacks the Green 4P and Marketing 4.0 integration. Second, generally accepted criteria for the evaluation of green furniture manufacturers are not available in the literature. Third, although the literature provides information on the implementation of Green 4P strategies, it is useful to develop these strategies for green furniture brands. Moreover, previous research has suggested consumer-oriented studies for the adoption of sustainability and green production and consumption [24–27]. With this study, we help green furniture brands to discover their shortcomings while providing them with the opportunity to evaluate themselves in the eyes of consumers. With the findings of our empirical analysis, we aim to facilitate the application part of Green 4P, which is difficult for green furniture brand managers to successfully implement. In addition, with this study, we aim to offer green furniture brands more sustainable, environmentally friendly, and green production and sales methods with the magnificent technological benefit of Marketing 4.0. Our study, in the context of the developing Turkish furniture industry, is the first study to determine the criteria for evaluating the green furniture performance related to the Marketing 4.0 period in order to enable the green furniture brands that take an active role in the sector to rank themselves in the eyes of the consumers with these criteria. Our findings help brand owners and managers who are on their way to producing green furniture or even having difficulties in implementing the Green 4P.

The work continues as follows: Section 2: Literature Review; Section 3: Methodology; Section 4: Results; Section 5: Discussions; Section 6: Conclusions.

2. Literature Review

In this section, we present the literature on the concepts of brand performance, green marketing, and Marketing 4.0, respectively. We then discuss recent work on studies based on multi-criteria decision-making problems.

2.1. Brand Performance

Brand performance shows the strength of a brand in the market [28]. Aaker, 1991 [6] sees market share, price, and distribution area as significant factors for measuring brand performance and argues that measurements made by considering market share extensively and sensitively reflect the position of the brand and its consumers. Supporters of this argument, including [29], focus on relative pricing (the ratio between the brand's closest competitors' prices and the brand's prices) and market share (the ratio of sales of the brand itself versus the sales of all brands producing the same product) as performance criteria for brands. Likewise, according to [30], price flexibility, price premium, brand market share, cost structure, profitability, and category success are the principal criteria for measuring brand performance. Therefore, as a scale factor of a brand's strategic achievements, brand performance is a reflection of the brand's success in the market [29,31,32]. The scale of a brand's performance varies according to market, industry, time, and other factors similar to these [32].

In the Marketing 4.0 period, where the competitiveness of the brands operating in the furniture industry increased, communication became easier, and marketing strategies became compatible with technology. In the next section, we present and analyze the 4Ps of Turkish green furniture brands.

2.2. Green Marketing in the Marketing 4.0 Period

In the competitive environment, the power of brands has become conditional on digital environments and social platforms where communication between consumers and brands becomes reciprocal. No matter how much the brands advertise, it is not as effective as the spontaneous conversations between consumers about the brand and the evaluations made on digital platforms. The cause is that these brands are experiencing the Marketing 4.0 period [33]. The adventure that started with Marketing 1.0 (product-oriented marketing), developed with Marketing 2.0 (consumer-oriented marketing), continued with Marketing 3.0 (people-oriented marketing), and now proceeds with Marketing 4.0, which is managed by technology, the Internet of things, and mutual communication [34]. In this sense, as a result of the evolution of Marketing 3.0, "Marketing 4.0" is a digital age that emerged as a result of complex changes brought by increased global competition, more informed and more demanding consumers, and the advancement of new technologies and innovations [34,35]. To create value for humanity, Marketing 4.0, in addition to the above-mentioned factors, by using advanced technology, enables consumers to interact with products and with each other in seconds, without mediators. Therefore, Marketing 4.0 combines online and offline brand-consumers and consumer-consumer interactions [33,36] have become a leader in all sectors. The relations with the external environment, competition, market information, and technological developments are possible with sustainable renewal; in addition to these, robotic software, artificial intelligence technologies, simulation technologies, digital connections, etc. for brands that are on the journey of robotization and digitalization, are possible with all these advantages of the Marketing 4.0 period, which will make the continuity of seller-buyer communication easier [37].

In the era of Marketing 4.0, where technology changes and develops at full speed, environmental concern is one of the issues which is becoming more important. Environmental preservation and sustainable development are becoming a global responsibility and advancing along with Marketing 4.0. To realize sustainable development that concerns all the stakeholders of the world, it is the responsibility of marketers, brands, companies, and investors to embrace sustainable production and consumption, develop themselves, and raise the awareness of all stakeholders [38]. A lack of research on sustainable production and consumption continues [18,39]. Sustainable development is built on not taking from

the future to meet today's needs. Although it seems conceptually easy to support green marketing, which we can define as brands and consumers incorporating the third-party and environment into marketing while shopping, it faces difficulties in practice.

The most practical steps of realizing green marketing in the Marketing 4.0 period, which are conceptually explained below, go through the 4Ps. Some of the green furniture brands are in transition to green marketing strategies in Turkey.

The production of green furniture by the Turkish furniture industry is very important for the sustainable development of not only the country but also the global furniture industry. Our expert group has listed the eleven green furniture brands that implement green marketing strategies in Turkey as follows: Bellona, Istikbal, Mondi, Enza Home, Yataş, Zell, Doğtaş, Çilek, Mudo Concept, Modalife, and Ersal. We reached the marketing managers of these eleven brands selected by the expert group through the LinkedIn platform. We received information about the processes of compliance with green marketing strategies. They said they are still in the adaptation process, are willing to accept all technologies for green production, and have received assistance to support their green marketing strategy. They said that they know the traditional 4P process well, they are implementing the change to Green 4P, and there is slow progress in consumers' intention to buy green furniture. In this context, first of all, we find it useful to explain the green marketing mix (Green 4P) in the Marketing 4.0 era.

2.2.1. Green Product

Producing green products means appealing to the consumer group whose members are aware of their environmental responsibilities. If the brand strives for the satisfaction of all its customers, and most importantly, if the vision of the brand is to benefit the whole society, to be a useful brand by taking into consideration social interests, this brand has to think about and solve the problems of the time in which it exists. If brands desire to do something to solve water, food, energy scarcity, and environmental pollution, which are among the problems of the following century, they can first "green" their products [40]. That is to say, these brands can produce green products by making traditional products more durable, repairable, and long-lasting, by making the product itself or a part of it in such a way that it can be reused, and, if possible, making it from raw material that can be reused after recycling, by replacing the traditional packaging of the product with recyclable packaging, and by minimizing the amount of packaging [18,41,42]. It is possible to use environmentally friendly and recycled raw materials that do not threaten the health of living creatures in the production and packaging of all product categories of furniture brands, such as panels, furnishing sets, carpets, beds, plinths, home textiles, home decoration materials, long-lasting painting, flooring, etc., and to produce green furniture by designing the furniture to be reused and recycled when its consumption is done.

Additionally, in the Marketing 4.0 period, which incorporates big data analysis and the Internet of things, these green furniture brands, which use software that collects and analyzes the demographic information of consumers, can, using this information, work on encouraging each of the consumers to buy products from their brands, or they can determine which products are bought, in what percentage, in which colors or dimensions according to consumers' demographic information such as the location, age, gender, etc. (For instance, three brands that take place among alternative brands in the methodology part of the study use cloud software called SAP. Using this software, brands can generate reports according to periods such as hours, days, months, years, etc. This software performs big data analysis on demographic information of consumers, products they buy, stocks of products, invoicing, etc. By these means, it forms green furniture sales forecasts for the future period.) At the same time, these brands may incorporate QR (Quick Response) codes (green labels) on the packages of their green furniture. Once consumers scan these codes using their smartphones, they can access all information about green furniture. This label includes all the environmental information, raw material information, recycling rate, etc. of

the furniture [43]. The green label is significant in directing consumers to green furniture and encouraging them to buy the said furniture [43].

2.2.2. Green Price

Green pricing, which is closely connected to green product quality, is related to the environmental performance of green products and their production from expensive raw materials, and consumers' readiness to pay more than traditional products due to high production costs [44]. The payment that consumers will make for eco-friendly furniture is usually higher than the standard. The important thing here is informing the consumers about why they should pay more. The widespread use of transparent pricing began with Marketing 4.0. The price list of eleven green furniture brands is displayed to consumers simultaneously in digital and physical form.

2.2.3. Green Place

The place has embraced a different form with technological solutions. Green place represents all the steps and integration of these steps from production to consumption, and in reverse, and regarding distribution in the production of green products. Traditional stores are no longer sufficient. Internet, artificial intelligence-supported software, virtual assistants, in general Marketing 4.0, which we will explain under the next heading, supports a green place mix while causing less consumption. In Turkey, the awareness of consumers toward green furniture has not yet developed significantly. In this sense, it is of great importance for brands to, in addition to their traditional stores, offer green products, particularly on their websites, mobile applications, and social media. In this manner, consumers gain their perceptions of where to find green furniture when they want it. Another side of the green place is the replacement of traditional stores with virtual stores. With a green place, more building costs, store display costs, physical product inventory costs, and employee expenses can be prevented. The Internet, intranet, and extranet provide transparent, open, frequent, fast, coordinated, and effective communication between green brand producers, brand distribution channels, brand sellers, and end consumers in the Marketing 4.0 period [45]. Below are the steps to be taken for green distribution.

- Less fuel consumption of vehicles providing transportation between distribution channels,
- reducing the number of trips with a more complex plan,
- minimizing environmental damage while doing all these.

These eleven green furniture brands use technologies such as various barcodes, frame codes, and RFID (Radio Frequency Identification) codes, as well as software that scans these labels and communication technologies. It can provide inventory management of products with less cost [46].

The GPS (Global Positioning System) used for the 4P applied for the Marketing 4.0 period makes things very easy for green distribution. This system conveys the position of products and distribution vehicles, preventing time loss and lack of information (Payne et al., 2017). In this context, there is no disruption in the green distribution processes of the eleven green furniture brands we examined. To reduce the distribution costs of these brands, replacing the vehicles with less costly fuel-operated vehicles (electric vehicles, hybrid vehicles, etc.) will provide a significant improvement. With Marketing 4.0, which uses internet technologies, stock management is easier, cheaper, and wasteless. Thanks to the software used, the number of intermediaries and costs in the distribution channels are reduced and sustainable production is supported. These eleven green furniture brands use a system that can directly reach the end consumer through their websites. Figure 1 shows the traditional green furniture channel system, whereas Figure 2 shows the green furniture channel system in the Marketing 4.0 period.

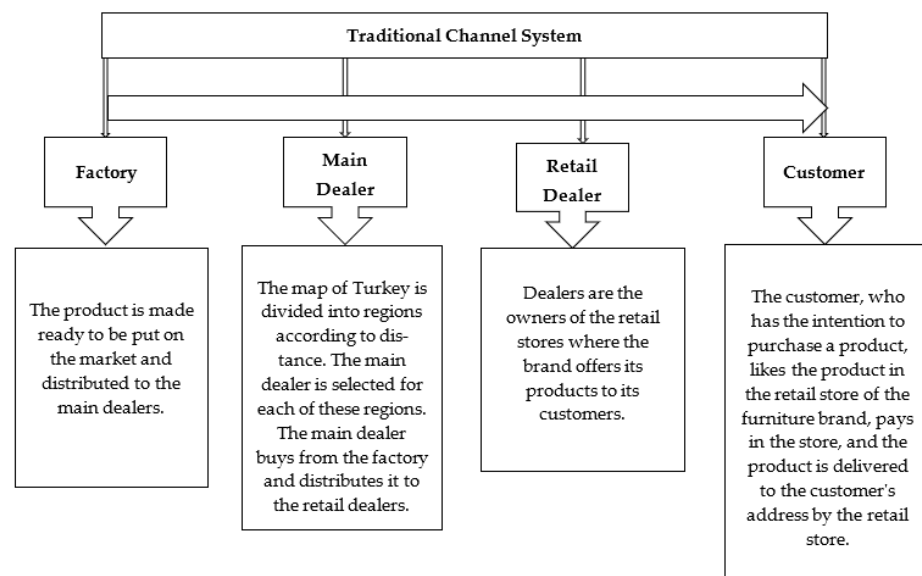


Figure 1. The Traditional Distribution Channel of Brands in the Turkey Furniture Industry.

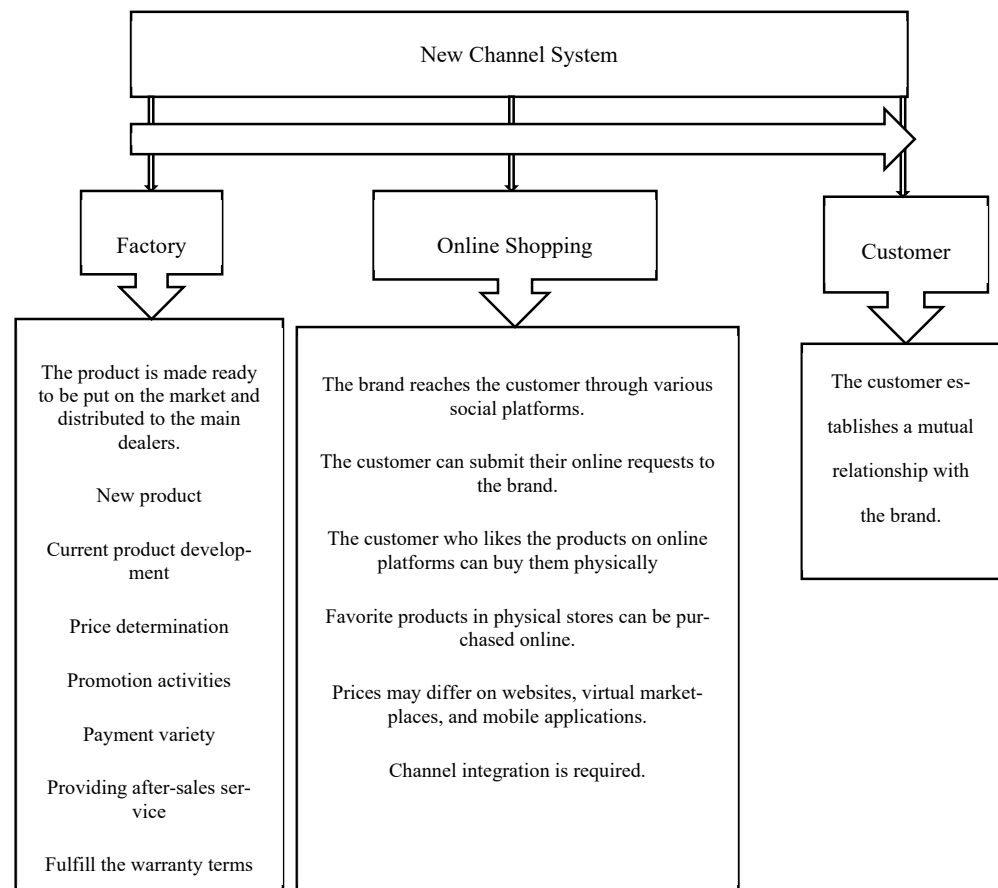


Figure 2. The New Distribution Channel of Brands in the Turkey Furniture Industry, Changed by Marketing 4.0.

2.2.4. Green Promotion

Advertising campaigns have a great role in the effort to create brand attitude, brand association, and brand awareness. Mutual communication with the customer has become more possible with Marketing 4.0. Digitalization, which allows us to communicate with consumers wherever the Internet can reach, at less cost rather than traditional visual or printed (catalog, newspaper, billboard, etc.) advertisements, is the advantage of Marketing 4.0 and

is essential for green promotion. That is to say, besides giving detailed information about green furniture, green advertising has something to do with reducing waste as well. For instance, the new advertising strategy of the brands is to produce content [33]. Content marketing, one of the new marketing methods of the Marketing 4.0 period, is defined by [47] as follows: “It aims to host, distribute content, and talk about engaging, relevant, outsourced content for a clearly defined consumer community.” Content marketing is the new digital advertisement nowadays. This is how brands create and present their stories. With the transparency of the Internet, it is possible for consumers to talk about brands and for brands to learn what they are talking about. Content marketing uses this. The eleven green furniture brands include content marketing in their traditional promotions, and besides this, they continue to offer promotions in digital environments where consumers gather, such as YouTube, the web, Google ads, Facebook, Twitter, and Instagram as well [48]. Marketing 4.0 also includes suggestions made by consumers directed to brands on their social media accounts. Marketing 4.0, which supports consumer-consumer, brand-consumer, and consumer-brand communications, sometimes improves the performance of furniture brands and sometimes worsens them. For example, websites such as *sikayet-var.com* (accessed on 3 May 2022) in Turkey collect consumers’ advice and complaints regarding brands and present them to all consumers.

On the other hand, digital advertising presents advertisements about the brand to the consumers, on the Internet, through the social media platforms of the said consumers or mobile phone users receiving advertisements based on their location. Marketing 4.0, which makes marketing communication two-sided, presents an opportunity for brands to offer individual promotions [41]. Digital promotions enable brands to be more effective at less cost. The eleven green furniture brands state that they obtain more valuable results from digital advertisements when comparing them to traditional advertisements such as billboards, TV, newspapers, etc. Green promotion, rather than the conventional benefits of the product, should include messages stating that green furniture is environmentally friendly and important for sustainable consumption, in that manner attracting consumer perception to sustainable consumption.

2.3. Multi-Criteria Decision Making (MCDM) Related Literature

The main purpose of this study is to determine the criteria and propose a method for the performance evaluation and selection of green brands for the Turkish furniture industry. Within the framework of this purpose, it defines the performance criteria to be used in the performance evaluation of green furniture brands and the selection of the green brand with the best performance. The study then leads to the implementation of the GFBPC. We use an integrated AHP-TOPSIS-SA model, which has proven successful in minimizing uncertainties in the decision-making process. AHP, which has been used for years, without losing its popularity, in cases where it is difficult to make decisions in many different fields and industries, is a measurement theory that facilitates the inclusion of subjective factors in research [49,50]. The use of integrated models for AHP and TOPSIS in areas such as green marketing strategies and sustainability is also quite common [51].

Firstly, we used the Analytical Hierarchy Process (AHP) method according to the weighted scoring of each performance evaluation criterion, which was classified by scoring in the previous stage. AHP is a simple, practical, and recommended model that determines the selection criteria according to the order of preference of alternatives in decision-making problems [22,52–55]. It is a good decision-making technique. With this methodology, the criteria of the study are determined according to the level of importance and pave the way for us to find the best alternative.

Secondly, in the study, the three brands with the highest market value in Turkey are ranked according to nine factors whose importance is determined by AHP. To perform this ranking, the TOPSIS method developed by [56], which is used in deciding the numerous best alternatives and solutions, is used. This technique, which coincides with the aim of our study, has been beneficial for us in ordering the performances of green furniture brands

(Brand X, Brand Y, Brand Z) from the perspective of consumers within the framework of the Marketing 4.0 period.

TOPSIS ranks the alternatives according to the positive and negative ideal solutions. Here, it provides the determination of the alternative that is the closest to the positive ideal solution and the farthest distance to the negative ideal solution, which makes the cost minimum and the utility maximum [57]. It compares the alternatives according to their relative distance values and ultimately calculates the performance scores to rank the alternatives [57].

Sensitivity analysis is a recommended method for use in MCDM studies. The reason for making this analysis is that there are performance criteria dominated by uncertainty and brand performances are ranked according to them. With this analysis, our ranking became clear.

The use of hybrid models is common in multi-criteria decision-making mechanisms that aim to determine the best alternative [21,58]. Selection models in performance appraisal have been used in some past research. However, it is recommended to use a hybrid multi-criteria model to find the best alternative [58,59]. Considering the recommendations, the study was built on the hybrid model. Brand performance evaluation studies have been carried out in the past. Some have used MCDM. Some studies with similar aspects to our study are given in Table 1.

Table 1. Summary of MCDM method used in brand performance.

Reference	MCDM	The Focus of the Study
[1]	TOPSIS	In this study, carried out in the furniture industry, MCDM was used for green supplier selection.
[60]	VIKOR, MOORA, TOPSIS, AHP, Sensitivity Analysis	The study, carried out for six different retail and wholesale companies in Turkey, measures financial performance.
[52]	FUZZY AHP and TOPSIS	In this study, researchers make performance rankings for three strong brands in the automotive industry.
[61]	FUZZY AHP, VIKOR	This study, carried out in India, determines the criteria that affect the retail brand preferences of individuals in their online clothing shopping.
[62]	AHP and FUZZY TOPSIS	This study aims to rank the performance of supply chains for sustainable production in India.
[63]	AHP and TOPSIS	In this study, researchers apply an integrated MCDM to rank representative concrete mixing methods, taking into account concrete mixing criteria.
[64]	AHP, VIKOR, TOPSIS	This study, which makes performance rankings of 10 companies in the Greek iron and steel industry, makes use of MCDM techniques.
[65]	AHP and TOPSIS	The study carried out with 100 young consumers determines the brand qualities necessary for the sustainability of 10 brands and makes performance rankings accordingly.
[66]	AHP and TOPSIS	It ranks the websites of 60 different companies operating in the wood industry.
[67]	SWOT, FUZZY AHP, and TOPSIS	This study lists the performances of supply companies in the context of sustainability.
[68]	OSM (Optimal Scoring Method) and AHP and TOPSIS	This study develops a framework for the selection of sustainable complementary concrete materials with TOPSIS by calculating the importance levels of technical, environmental, social, and economic sustainability criteria with AHP.

3. Methodology

The expert group selected for this study was made between December 2021 and January 2022. The expert group held three online meetings between 15 January 2022 and 25 February 2022. The AHP questionnaire was sent to 19 experts via e-mail on 27 February 2022. Survey data were collected within three days. The selection of four decision-making

experts from the expert group took place on 12 March 2022. The TOPSIS questionnaire was sent to four experts on 14 March 2022 and data were collected on the same day.

The research given in Table 1 carried out in different sectors and countries benefited from the benefits of MCDM techniques. In this study, we have adopted the AHP technique to determine the weights of GFBPC (criteria affecting the performance of green furniture brands) for the Marketing 4.0 period, based on the important studies given in Table 1. We preferred the AHP technique because it has been suggested in many studies to use it in situations where the relative importance of factors is uncertain. This method, which is recommended to be used when choosing between more than one criterion is required in environments where the relative importance of factors is uncertain, helped us to determine the importance levels of the criteria for evaluating the performance of green furniture brands by consumers in the Marketing 4.0 period.

We used the criteria weights obtained with the AHP to rank the performance ratings of green furniture brands (Brand X, Brand Y, Brand Z). To choose among alternatives in uncertain environments, we used the TOPSIS technique as it is widely recommended to select the best alternative by ranking [56,69–71]. In other words, TOPSIS (Ranking of Preferences Relationship to Ideal Solution Technique), which is widely used in uncertain environments and enables the selection of the best alternative by ranking, formed the second method of our study [56]. Finally, we used sensitivity analysis because we wanted to investigate the stability of the results obtained with TOPSIS and to reach a more robust conclusion. Sensitivity analysis (SA) is a trending analysis recently in investigating the accuracy of the results of multi-criteria research problems. Figure 3 summarizes the methodological (integrated AHP-TOPSIS-SA) steps of our study.

Step 1. Selection of decision-making expert group:

We found that in most AHP studies, different numbers of experts came together to determine factors, and we did not find a limitation on the number of expert staff (for example, [49,72]). In this context, we formed an expert group of 19 people to determine the factors of the study (decision group profiles are given in Appendix A). To reach accurate results, we expected that our expert decision-making group, consisting of academicians who are experts in the field of Marketing 4.0, brand performance, and green marketing, would make the most accurate assessment with their experience and academic knowledge.

Step 2. Selection of green furniture brands:

We first started the data collection phase to determine the best green furniture brands in Turkey. We have determined the three biggest green furniture brands (Brand X, Brand Y, and Brand Z) according to the market value ranking in Turkey.

Step 3. A scale is created for AHP and TOPSIS according to the decision-making criteria. The validity and reliability of the scale are tested.

To support the sustainable success of green furniture brands in the developing Turkish furniture industry, the evaluation criteria affecting the performance, conceptualization, development, and implementation of “Turkish furniture industry” brands in Marketing 4.0 should be analyzed. We held an online meeting with our expert group. Our decision-making expert group approved the nine criteria we presented, based on studies cited in indices such as SSCI, SCI, and Scopus.

The necessary criteria, which should be considered for furniture shopping in the Marketing 4.0 period determined by the decision-making group in our research, and which were analyzed with various statistical and mathematical modeling techniques in the methodology part of the study, are grouped under nine categories: Co-creation of Value (C_1), Pricing (C_2), Channel (C_3), Promotional Activities (C_4), Product Quality (C_5), Product Variety (C_6), Trust and Loyalty to the Brand (C_7), After-Sales Service (C_8), and Variety of Payment Options (C_9).

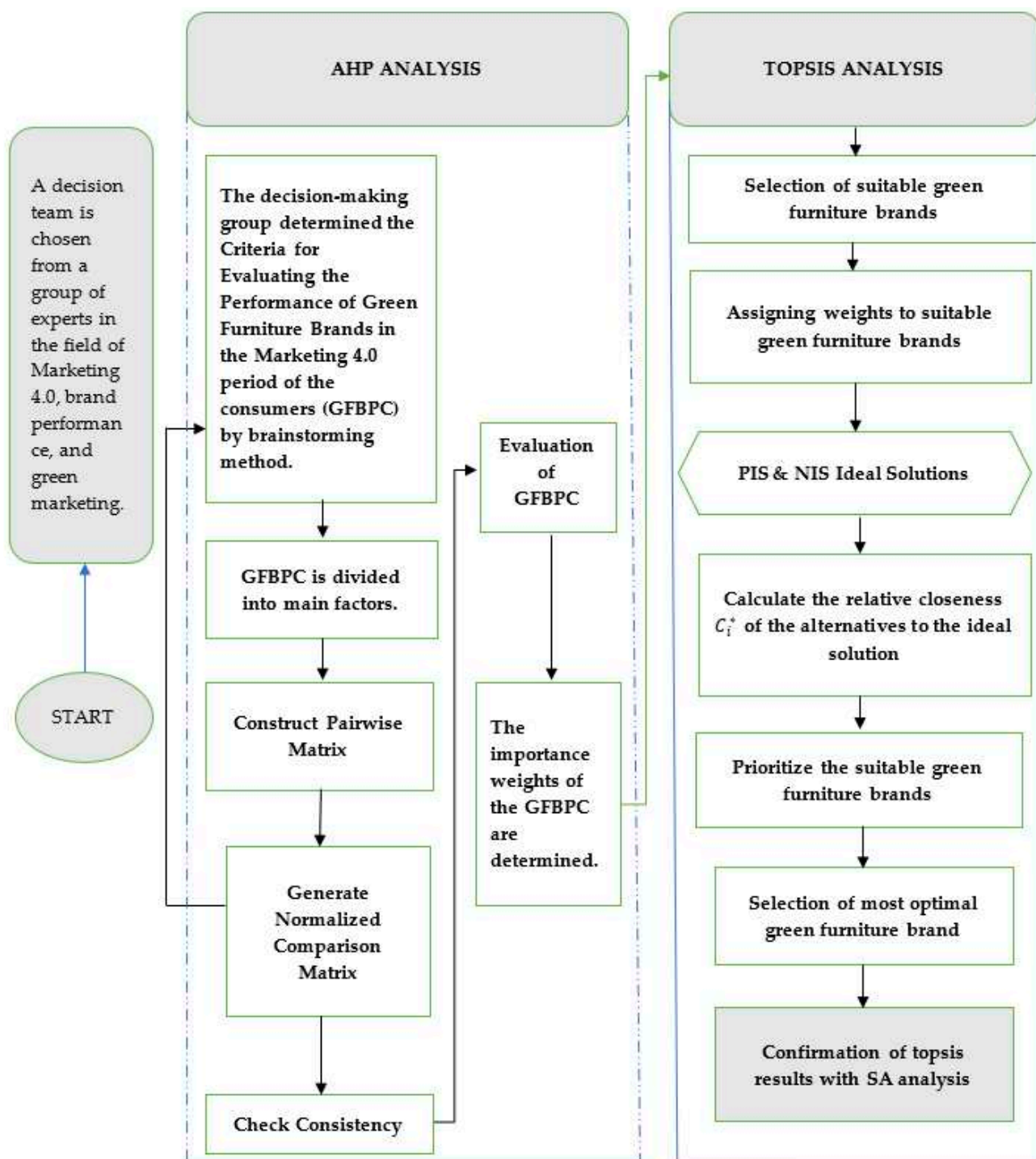


Figure 3. A schematic framework of the methods used in the research.

3.1. Co-creation of Value (C_1)

Past research has been carried out on Co-creation of Value in different sectors. Co-creation of Value has a positive effect on customer satisfaction [73–75]. It has a high level of influence on brand performance evaluation. Therefore, Co-creation of Value is effective on brand performance [76–79]. Here, Co-creation of Value is when brands involve their customers before they develop new products [37].

Before giving other criteria (C_2 , C_3 , C_5 , C_6 , C_7 , C_8 , and C_9) we find it useful to give the image of the brand it is included in. Brand image, which includes consumers' subjective, emotional, and physical perceptions of a brand, is one of the phenomena used in brand

performance evaluation [80–83]. A brand with a high brand image has a high value on the consumer side. Brand image is all the positive and negative things that come to mind for the consumer when they think about the brand. C_2 , C_3 , C_5 , C_6 , C_7 , C_8 , and C_9 are factors that affect a brand's image. Therefore, they are effective in brand performance evaluation.

3.2. Pricing (C_2)

It has changed from standard to green. With the inclusion of the technology brought by Marketing 4.0 into marketing and the personalized green price application that was previously applied in sectors such as travel and airlines, online retailers collect a huge amount of data and analyze these data to apply personalized pricing. In other words, in the digital economy, the green price fluctuates like an exchange rate depending on the market demand [37,55,84].

3.3. Channel (C_3)

It is one of the criteria that changes with the desire of consumers to receive the same service from more than one channel. In the Marketing 4.0 period, brands that continue to transition from multichannel service to omnichannel service, with this new transformation, offer their consumers web, mobile, physical stores, etc., to provide service from brand sales points. A brand's omnichannel service affects brand performance positively [85–87].

3.4. Promotion Activities (C_4)

The concept of promotion has almost evolved [83]. Promotion efforts that previously conveyed the brand's messages to the customer are now two-way through social media. Through social platforms, customers present their thoughts and positive and negative recommendations about the brand to other potential customers, score them, and even share their direct views on the brand [37]. There is social media marketing, influencer marketing, content marketing, etc. Promotional activities changing with marketing strategies have discouraged brands from traditional promotion efforts. With Marketing 4.0, which makes two-sided interaction possible, consumers consider the diversity of communicating with brands and feel entitled to send notifications to the brand at any time. Another changing part of promotional activities is digitalizing advertisements, artificial intelligence compatible visuals, virtual assistants, big data usage, and attracting customers to the brand by offering advertisements, promotions, and campaigns. The effectiveness and efficiency of all these promotion efforts positively affect brand performance [88,89].

3.5. Product Quality (C_5)

It is a promise that the manufacturer and the seller will continuously offer certain features, benefits, and services to the consumers. It also expresses the quality guarantee and has different meanings for the consumers of the product. Consumers, who are interested in the physical quality of the brand's products, make comments on the quality of the product as they see the monetary value and moral expectation they give. Green product quality is the result of four criteria [90]:

Qualification: A brand primarily evokes certain qualities of the product. One or more of these qualifications are used in the brand's advertisements.

Benefit: Consumers often buy the benefits of products, not qualifications. Therefore, qualities are turned into functional and emotional benefits.

Value: It is about the brand evoking something about the buyer's values.

Personality: The relationship between the true or desired self-image of a brand and the emotional elements of the consumer.

3.6. Product Variety (C_6)

It is the variety of the product category of the green furniture brand [91]. Since the scope of this study is the green furniture sector, variety can be categorized as panel furniture (bedroom sets and parts, dining room sets and parts, kitchen tables and chairs, teen room sets, etc.), upholstered group (sofa set and parts, seating groups, sofas, pouf,

chair), spring group (bed), bed base, headboard, accessory (coffee table, nesting table, corner table, dresser, mirror, clock, painting), and woven group (carpet, rug).

3.7. Trust and Loyalty to the Brand (C_7)

Green trust in a green brand is believing in a green brand before the intention to buy from it; the good intention of the customer is also important. Customers may think of the green brand as a personalized entity and always expect long-term and safe reactions from this green furniture brand. It is expected that as long as the expectations are met, there will be satisfaction with the brand and as the satisfaction level increases, loyalty to the brand is expected to be formed [92]. As brands gain special, positive, and distinctive meaning in the minds of consumers, they become irresistible and irreplaceable and gain the loyalty of consumers. In turn, brand loyalty brings sales revenue, market share, and profitability to companies and helps them grow or at least keep their place in the market [87].

3.8. After-Sales Service (C_8)

It includes guarantees, free shipping service, free on-site assembly, free customer advisory lines, and such services offered to consumers who want to shop from the brand [93].

3.9. Payment Variety (C_9)

It includes the ability to offer payment options (cash, 6-12-18, and more maturity options) to suit the consumer's budget. It includes applications such as mobile payment, internet banking, etc. [94].

Step 4. Instrument Development for AHP:

According to the green furniture brands' performance criteria determined by the decision-making group, we created a questionnaire with a 5-point Likert score to perform the AHP analysis. The survey consists of nine items determined by the expert staff and the results of the related studies. In relation to the items in the survey for the green furniture brands' performance criteria, we asked the participants to respond on a 5-point Likert scale as, "1 = very satisfied, 2 = satisfied, 3 = neutral, 4 = not satisfied, or 5 = very dissatisfied".

Step 5. Sample selection and demographic information for the validity and reliability analysis of the AHP scale:

Considering the time constraint, the random sampling method was used to obtain an appropriate sample size with a valid response for the study. According to Saunders et al. (2009), the required sample size is 384 respondents to obtain an accurate result with a 95% confidence interval in populations of more than 100,000. The survey was applied to 649 people residing in Turkey who bought or are considering buying green furniture, between November 2021 and December 2021, using a simple random selection method, personally and via e-mail. Of the distributed surveys, 393 surveys were included in the study. The demographic information of the participants was analyzed using SPSS 22.0. The demographic results of the participants are as follows: the proportions of the group are female (49.56%), male (50.44%), single (40.68%), married (59.32%), majority of them are graduates (52.09%), the average age is 25–44 years (81.75%), and the majority of occupations are artisans (26.62%) and employees in the private sector (21.04%).

Step 6. Reliability and Validity Analysis for AHP Scale:

For the reliability analysis of the AHP scale, we used the Cronbach's Alpha > 0.70 value [95]. Construct validity is about what is being measured, and factor analysis is the most widely used method to test it. Therefore, in order to check the validity of the AHP scale, we performed a factor analysis in the SPSS program with the collected data. In the evaluation of our factor analysis findings, we used the KMO $\geq$ 0.5 value, the Barlett sphericity test $p < 0.01$, and the relationships between the variables [96].

Step 7. Instrument Development for TOPSIS:

This questionnaire is prepared to rank alternative brands. We prepared the second questionnaire, which asked them to score each alternative from one to nine (1 = Very Relevant and 9 = Very Strongly Related) under each criterion, to present to a group of four

decision-makers to rank the brand performances according to the criteria clarified with the AHP [97]. At this stage, participants were asked to ensure values for nine clusters based on nine dimensions on a scale of 1–9. Respondents are expected to evaluate the clusters comparatively with each other in the context of each dimension.

Step 8. Establishment of the Hierarchical Structure Model:

A hierarchical model was established for the nine criteria of the study and the three selected green furniture brands [98] (Figure 4). The target criteria are divided into three primary levels, as shown in Figure 4. The first level of the hierarchy is general-purpose. Level 2 is the criteria for selecting the green furniture brand with the best brand performance. At level 3, there are three brands named brands X, Y, and Z, respectively.



Figure 4. Hierarchical Structure for AHP.

Step 9. A pairwise comparisons matrix is created for the answers of the decision-making groups:

After the first nine steps were performed, the pairwise comparisons method used in the AHP analysis was performed to determine the importance of the criteria.

We used the data obtained from the experts' answers to the criteria with the scores in Table 2 to obtain the comparison matrix. The results are shown as a pairwise comparisons matrix (Equation (1)):

Table 2. Pairwise comparison for preferences.

Important Values	Definition	Description
1	Equal importance	Elements i and j are equally important
3	Moderate importance	Element i is weakly more important than element j
5	Strong importance	Element i is strongly more important than element j
7	Very strong importance	Element i is very strongly more important than element j
9	Absolute importance	Element i is absolutely more important than element j
2, 4, 6 and 8	Intermediate values	Represents compromise between the priorities

$C_1, C_2, \dots, C_n$ are elements in a set where a_{ij} expresses a calculated judgment about a pair of C_i and C_j elements. $W_1, W_2, \dots, W_n$ denote judgments [50,53,99]. When A is a consistency matrix, the relationship between W weights and a_{ij} judgments is given by

$$a_{ij} = W_i / W_j, \quad W_i, W_j > 0 \text{ for } i, j = (1, 2, \dots, n) \quad (1)$$

A reciprocal value is designated to the inverse comparison in the pairwise comparison matrix. Here a_{ji} by criterion i is the comparison value of the criterion, and the value a_{ji} is obtained from $1/a_{ij}$.

$$A = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ a_{21} = 1/a_{12} & 1 & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} = 1/a_{1n} & a_{n2} = 1/a_{2n} & \dots & 1 \end{bmatrix} \quad (2)$$

Pairwise comparison matrices were established with the data obtained from each decision maker. The binary matrices formed by more than one decision maker were reduced to a single binary comparison matrix with the geometric mean equation ($a_{ij} = (\prod_{l=1}^k a_{ijl})^{1/k}$, $i, j = 1, 2, 3, \dots, n; i \neq j$) and the AHP steps were continued.

Step 10: Significance weights are calculated for the GFBPC and its consistency is tested.

After the pairwise comparison matrix was created, the eigenvalue method was used to calculate the relative weights of the GFBPC. The eigenvalue method is used to estimate their relative weights. With the eigenvalue method, we could obtain the relative weights (W) for each criterion of the GFBPC with the following equation:

$$A \times W = \lambda_{max} \times W \quad (3)$$

where λ_{max} symbolizes the largest eigenvalue of the pairwise comparison matrix A . According to [50], the largest eigenvalue λ_{max} can be calculated by the formula [100]:

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \left[\frac{\sum_{j=1}^n [a_{ij} w_j]}{w_i} \right] \quad (4)$$

Each element of the matrix is normalized by dividing it by its column sum. The sum of each column of the normalized matrix is given by Equation (5).

$$a'_{ij} = \frac{a_{ij}}{\sum_{i=1}^n a_{ij}}, \quad i, j = 1, 2, \dots, n \quad (5)$$

The priority vector is calculated. The sum of each row of the normalized matrix is averaged by dividing it by the size of the matrix. These values are the importance weights calculated for each criterion. These weights form the priority vector.

$$w_i = \left(\frac{1}{n} \right) \sum_{i=1}^n a'_{ij} \quad i, j = 1, 2, \dots, n \quad (6)$$

The above equation is used. Thus, the percentage importance distributions, which show the importance values of the criteria concerning each other, can be obtained.

Saaty (1990) suggested utilizing consistency index CI and consistency ratio CR to inspect the consistency of the comparison matrix. CI and CR were computed as follows [100]:

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (7)$$

$$CR = \frac{CI}{RI} \quad (8)$$

Here RI , is the mean CI value over numerous random entries of reciprocal matrices of the same order. If the CR value was < 0.1 , the prediction was accepted. Otherwise, a new comparison matrix was requested.

In this study, the AHP method helped calculate the priorities of nine criteria for performance evaluation, which was done in the second stage to order the clusters.

Step 11. The decision matrix based on the importance weights of the GFBPCs obtained from the AHP is created:

TOPSIS is one of the most common decision-making methods used in ranking the alternatives. Our expert group identified the three green furniture brands with the highest import and export data out of eleven green furniture brands. We contacted these furniture brands and they said that their names can appear in the article, however they do not want to take responsibility for such a comparison. For this reason, we protect the privacy of brands in this study. We give the names of Brand X, Brand Y, and Brand Z to the selected brands, respectively. We have prepared a survey for TOPSIS. With this survey, we again asked our decision-making expert group (four experts determined by the expert group) to evaluate each of these three brands, determined by our group, according to the consumer green furniture brand evaluation criteria, which were clarified by the AHP method, with a scoring scale ranging from “1 = very little related to 9 = very strongly related”. We performed a TOPSIS analysis with the obtained data.

The steps (13, 14, 16, 17, 18, 19) of the TOPSIS method are given below in detail [56]. After obtaining the importance weights of GFBPCs with the AHP method and testing their consistency, a decision matrix was created according to the scores of four experts for green furniture brand alternatives (Brand X, Brand Y, Brand Z), which means that they represent green brand performance ratings according to GFBPCs.

Step 12: Decision matrices are generated D^k ; $k = 1, \dots, K$ for every 4 DMs.

$$D^k = \begin{matrix} & \begin{matrix} A_1 \\ A_2 \\ \vdots \\ \vdots \\ A_m \end{matrix} \end{matrix} = \begin{bmatrix} x_{11}^k & x_{12}^k & \dots & x_{1j}^k & \dots & x_{1n}^k \\ x_{21}^k & x_{22}^k & \dots & x_{2j}^k & \dots & x_{2n}^k \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{i1}^k & x_{i2}^k & \dots & x_{ij}^k & \dots & x_{in}^k \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{m1}^k & x_{m2}^k & \dots & x_{mj}^k & \dots & x_{mn}^k \end{bmatrix} \quad (9)$$

where A_i indicates the green furniture brand alternatives, $i, i = 1, 2, 3, \dots, m$; X_j stands for GFBPCs, $j = 1, 2, 3, \dots, n$, with quantitative and qualitative data. x_{ij}^k shows the performance rating of green furniture brand alternatives A_i in terms of attribute X_j by 4DMs $k = 1, \dots, K$, and x_{ij}^k is the element of D^k . It is considered that there should be K , decision matrices for 4DMs.

Observe that we can also set the outcomes of qualitative attributes from each green furniture brand as discrete values, linguistics values (Table 2), so that the quantitative values will be establish in the above decision matrix.

Step 13. Construct the normalized decision matrix R^k ; $k = 1, \dots, K$ for each 4 DMs.

For 4DMs k , the normalized value r_{ij}^k of the decision matrix R^k can be any linear-scale conversion to keep $0 \leq r_{ij}^k \leq 1$.

$$r_{ij}^k = \frac{x_{ij}^k}{\sqrt{\sum_{k=1}^m (x_{ij}^k)^2}}, \quad (i = 1, 2, \dots, m; j = 1, 2, \dots, n; k = 1, \dots, K) \quad (10)$$

Step 14. Calculate the weighted normalized matrix:

For the new matrix formed by normalizing the decision matrix, the following equation is applied and a weighted decision matrix is created. The weighted normalized decision matrix $T_{ij}^k = X_i^k * R_{ij}^k$; $i = 1, 2, 3, \dots, m$; $j = 1, 2, 3, \dots, n$; $k = 1, \dots, K$, is shown [101].

$$T_{ij}^k = \begin{bmatrix} x_1^k r_{11}^k & x_2^k r_{12}^k & \dots & x_n^k r_{1n}^k \\ x_1^k r_{21}^k & x_2^k r_{22}^k & \dots & x_n^k r_{2n}^k \\ \vdots & \vdots & \ddots & \vdots \\ x_1^k r_{m1}^k & x_2^k r_{m2}^k & \dots & x_n^k r_{mn}^k \end{bmatrix} \quad (11)$$

Step 15. The positive ideal solution (PIS) and the negative ideal solution (NIS) are determined for each 4DMs:

PIS consists of the best achievable criterion values, while NIS consists of the worst achievable criterion values. The maximum value of utility attributes constitutes PIS (V^{k+}), while the minimum value of utility attributes constitutes NIS (V^{k-}). Finding the positive ideal solution (PIS) sets is shown in the formula below [101].

$$V^{k+} = \left\{ \left(\max_i t_{ij}^k | j \in J \right), \left(\min_i t_{ij}^k | j \in J' \right) \right\} \quad (12)$$

Then, finding the negative ideal solution (NIS) sets is shown in the formula below.

$$V^{k-} = \left\{ \left(\min_i t_{ij}^k | j \in J' \right), \left(\max_i t_{ij}^k | j \in J \right) \right\} \quad (13)$$

where J is associated with the benefit criteria and J' is associated with the cost criteria; $i = 1, 2, \dots, m$; $j = 1, 2, \dots, n$; $k = 1, \dots, K$.

Step 15a. Assign a weight vector W to the attribute set for 4DMs.

Each 4DMs will reveal weights for GFBPC as w_j^k , where, $j = 1, 2, \dots, n$, and $\sqrt{\sum_{j=1}^n w_j^k} = 1$ and for each 4DMs $k = 1, \dots, K$. Each element of the weight vector W will be the study of corresponding elements of weights of attributes per 4DMs.

Step 16. Calculate the separation measure from the ideal and the negative ideal solutions, $\overline{S}_i^+$ and $\overline{S}_i^-$ respectively, for 4DMs.

There are two sub-steps to be considered in Step 16 [101]. The first one concerns the distance measure for individuals; the second one aggregates the measures for 4DMs.

Step 16a. Calculate the measures from PIS and NIS individually.

For DM k , his or her separation measures from PIS and NIS are computed through Minkowski's L_p metric. The individual separation measures of each alternative from the PIS and NIS are

$$S_i^{k+} = \left\{ \sqrt[p]{\sum_{j=1}^n w_j^k (v_{ij}^k - v_j^{k+})^p} \right\}^{1/p} \quad (14)$$

and

$$S_i^{k-} = \left\{ \sqrt[p]{\sum_{j=1}^n w_j^k (v_{ij}^k - v_j^{k-})^p} \right\}^{1/p} \quad (15)$$

where $p \geq 1$ and integer, w_j^k is the weight for the attribute j and DM k , and $\sqrt{\sum_{j=1}^n w_j^k} = 1$, $k = 1, \dots, K$.

Step 16b. Calculate the measures of PIS and NIS for the 4DMs.

The operation can offer many choices, geometric mean, arithmetic mean, or their modification. If we take the geometric mean of all individual measures, the group measures, Equations (14) and (15), from PIS and NIS will be

$$\overline{S_i^+} = \left(\prod_{k=1}^K S_i^{K+} \right)^{1/K} \text{ for green furniture brand alternatives } i \quad (16)$$

and

$$\overline{S_i^-} = \left(\prod_{k=1}^K S_i^{K-} \right)^{1/K} \text{ for green furniture brand alternatives } i \quad (17)$$

Step 17. Calculate the relative closeness $\overline{C_i^*}$ to the ideal solution for the group.

Calculate the relative closeness to the ideal solution and rank the green furniture brand alternatives in descending order. The relative closeness of the i th alternative A_i with respect to PIS can be expressed as:

$$\overline{C_i^*} = \frac{\overline{S_i^-}}{\overline{S_i^-} + \overline{S_i^+}} \quad (18)$$

where $0 \leq \overline{C_i^*} \leq 1$ The larger the index value, the better the performance of the alternative.

Step 18. Rank the alternatives (Brand X, Brand Y, Brand Z) according to the closeness coefficient:

For determining the rank of an alternative green furniture brand, the higher $\overline{C_i^*}$ value indicates that the alternative is the best solution or the most preferred. That is, a larger closeness coefficient value $\overline{C_i^*}$ means a better alternative. The green furniture brand with the largest affinity coefficient will be selected as the green brand with the best performance.

Step 19. Sensitivity analysis (SA) is carried out:

It is an extremely important type of analysis to test whether the decisions are affected by the changing environment, which is useful for obtaining consistent results to test the accuracy of the ranking obtained with TOPSIS [102]. Before comparing the AHP and TOPSIS results to the literature, we performed the sensitivity analysis, which allowed us to be sure of ourselves. The most common type of sensitivity analysis is to calculate the variation of results with a small perturbation change in the input parameters. It is a situation that is accepted that the findings obtained with MCDM techniques are not conclusive. Therefore, we reinforced the analysis of the study with Sensitivity analysis.

This section may be divided into subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

4. Results

In this section, we present the application and findings of our empirical research, AHP, TOPSIS, and Sensitivity analysis.

4.1. Reliability and Validity Results for the AHP Scale

The Cronbach's alpha (0.854) > 0.70 value of the scale we created for AHP was within the range requested by the literature (Table 3).

Table 3. Reliability Results for the AHP Scale.

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted
C ₁	32,751	21,652	0.444	0.851
C ₂	32,636	21,798	0.424	0.852
C ₃	32,735	21,450	0.419	0.853
C ₄	32,947	20,643	0.315	0.875
C ₅	33,020	18,943	0.704	0.826
C ₆	33,333	18,646	0.738	0.822
C ₇	33,117	19,093	0.724	0.824
C ₈	33,204	18,724	0.750	0.821
C ₉	33,333	18,646	0.738	0.822

Cronbach's Alpha = 0.854.

On the other hand, our KMO = 0.841 > 0.05 and Bartlett's Test of Sphericity ($p < 0.01$) values for the factor analysis values we applied for the validity of the scale provided the value range requested by the literature [96] (Table 4). Factor analysis findings gathered 9 questions under two factors. All factor load weights were found to be higher than, 70 values [103]. In this study, we used each survey question as the main criterion for the AHP application, even though the question items consisted of two main factors.

Table 4. Factor structure of principal factors extraction and varimax rotation.

Factors	Factor Loading	% of Variance Explained	Cumulative % Age of Variance Explained
C ₁	0.784	3852	42,800
C ₂	0.790	2243	24,921
C ₃	0.797		
C ₄	0.454		
C ₅	0.855		
C ₆	0.866		
C ₇	0.852		
C ₈	0.879		
C ₉	0.887		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy. (KMO)		0.841	
Bartlett's Test of Sphericity		Approx. Chi-Square	2,094,742
		df	36
		Sig.	0.000

4.2. AHP and TOPSIS, SA Results

We sent the AHP questionnaire to our expert decision group of 19 by e-mail. In this research, we used expert scores to obtain the pairwise comparison matrix in the AHP method to get the real answer from the 19 DMs' point of view. 19 DMs scored the questions in the AHP questionnaire from 1 to 9 (Saaty scale) in Table 2 [53].

We created 19 separate pairwise comparison matrices for each decision maker using Equations (1) and (2) is presented in Table 5. That is, later, we created a Normalized Pair-Wise Comparative Matrix using Equations (3)–(5) (Table 6).

Equation (6) are used to calculate the priorities for the dimensions. C₁, C₂, C₃, C₄, C₅, C₆, C₇, C₈ and C₉ listed in Table 7 have weights of 0.19, 0.19, 0.15, 0.12, 0.09, 0.09, 0.06, 0.06, and 0.05, respectively analysis became clear with the result values being compatible with the literature. According to Table 7; It is seen that the two criteria are co-creation to value and pricing with a significance level of 0.19. The criterion with the lowest importance is the variety of payment options, with two criteria weighing 0.05.

Table 5. Pair-wise Comparison Matrix.

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉
C ₁	4.00	1.00	4.00	5.00	4.00	2.00	5.00	2.00	2.00
C ₂	0.50	8.00	4.00	3.00	3.00	3.00	2.00	4.00	3.00
C ₃	0.50	0.33	1.00	8.00	4.00	4.00	6.00	8.00	7.00
C ₄	0.50	0.33	0.25	1.00	6.00	6.00	5.00	5.00	9.00
C ₅	0.33	0.33	0.50	0.33	1.00	8.00	8.00	8.00	5.00
C ₆	0.50	0.50	0.50	0.33	0.50	1.00	6.00	4.00	8.00
C ₇	0.50	0.33	0.33	0.50	0.33	0.33	1.00	8.00	9.00
C ₈	0.50	0.33	0.50	0.50	0.50	0.50	0.50	1.00	9.00
C ₉	0.50	0.50	0.33	0.50	0.33	0.50	0.50	0.50	1.00

Table 6. Normalized Comparative Matrix.

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉
C ₁	0.51	0.09	0.35	0.26	0.20	0.08	0.15	0.05	0.04
C ₂	0.06	0.69	0.35	0.16	0.15	0.12	0.06	0.10	0.06
C ₃	0.06	0.03	0.09	0.42	0.20	0.16	0.18	0.20	0.13
C ₄	0.06	0.03	0.02	0.05	0.31	0.24	0.15	0.12	0.17
C ₅	0.04	0.03	0.04	0.02	0.05	0.32	0.24	0.20	0.09
C ₆	0.06	0.04	0.04	0.02	0.03	0.04	0.18	0.10	0.15
C ₇	0.06	0.03	0.03	0.03	0.02	0.01	0.03	0.20	0.17
C ₈	0.06	0.03	0.04	0.03	0.03	0.02	0.01	0.02	0.17
C ₉	0.06	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.02

Table 7. Priorities for Criteria (GFBPC).

Criteria	Criteria	Priority Value
C ₁	Co-creation to value	0.19
C ₂	Pricing	0.19
C ₃	Distribution channels	0.16
C ₄	Promotion activities	0.13
C ₅	Product Quality	0.11
C ₆	Product Variety	0.07
C ₇	Trust and loyalty to the brand	0.06
C ₈	After-sales service	0.05
C ₉	Diversity of payment options	0.03

Consistency analysis was performed using Equations (7) and (8) to identify possible errors in the AHP application (Table 8). Since the CR value is $0.08 < 0.10$ according to Table 8, the criteria determined by the experts in this study (co-creation to value, pricing, channels, promotional activities, product quality, product variety, brand trust, and loyalty, sales) after-service, variety of payment options) availability is demonstrated by the consistency test.

After the weights of the criteria were obtained with the AHP method, a decision matrix was created to represent the green brand performance ratings of the green furniture brand alternatives according to the GFBPCs. We used the importance weights of GFBPCs obtained by the AHP method for the TOPSIS technique. How the TOPSIS results were analyzed is given in the following application steps:

The decision-making group, consisting of four experts selected among 19 DMs, evaluated the green furniture brands (Brand X, Brand Y, Brand Z) and their compliance with each green furniture brand performance evaluation criteria, whose importance weights were determined by AHP, Saaty scale, between 1 and 9 scored (Table 2) [100].

In Tables 9–12, respectively, the decision matrix created by the Equation (9) for the points given by each expert to each green furniture brand alternative for each GFBPC, and the normalized decision matrix created by Equation (12), contains the weighted normalized

decision matrices that we created with Equation (13). Note: Since our criteria are benefit criteria, we did not calculate according to cost criteria.

Table 8. Consistency Test Findings.

Criteria	Criteria Weight	C Total
C ₁	0.19	1.91
C ₂	0.19	2.01
C ₃	0.16	1.61
C ₄	0.13	1.25
C ₅	0.11	0.91
C ₆	0.07	0.84
C ₇	0.06	0.61
C ₈	0.05	0.57
C ₉	0.03	0.48
λ_{max}		10.04
CI		0.13
RI		1.45
CR		0.08 < 0.10

Table 9. First expert's decision matrix, normalized decision matrix, and the weighted normalized decision matrix.

1st Expert's Decision Matrix										1st Expert's Normalized Decision Matrix										1st Expert's Weighted Normalized Decision Matrix									
0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03	
C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	
X	5	4	4	4	3	3	8	8	4	X	0.43	0.59	0.37	0.31	0.24	0.32	0.55	0.60	0.37	X	0.08	0.11	0.05	0.03	0.02	0.03	0.03	0.03	0.02
Y	9	5	9	9	9	7	9	7	9	Y	0.7	0.74	0.84	0.70	0.72	0.76	0.62	0.52	0.84	Y	0.14	0.14	0.12	0.08	0.06	0.06	0.04	0.03	0.04
Z	5	2	4	8	8	5	8	8	4	Z	0.43	0.29	0.37	0.63	0.64	0.54	0.55	0.60	0.38	Z	0.08	0.06	0.06	0.08	0.06	0.05	0.03	0.04	0.02

Table 10. Second expert's decision matrix, normalized decision matrix, and the weighted normalized decision matrix.

2nd Expert's Decision Matrix										2nd Expert's Normalized Decision Matrix										2nd Expert's Weighted Normalized Decision Matrix									
0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03	
C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	
X	9	9	8	8	9	6	6	8	2	X	0.60	0.60	0.55	0.55	0.60	0.45	0.56	0.82	0.16	X	0.11	0.11	0.08	0.07	0.05	0.04	0.03	0.05	0.01
Y	8	8	8	9	9	9	8	4	8	Y	0.53	0.53	0.55	0.62	0.60	0.67	0.74	0.41	0.66	Y	0.10	0.10	0.08	0.07	0.05	0.06	0.04	0.02	0.03
Z	9	9	9	8	8	8	4	4	9	Z	0.60	0.60	0.62	0.55	0.53	0.59	0.37	0.41	0.74	Z	0.11	0.11	0.09	0.07	0.05	0.05	0.02	0.02	0.04

Table 11. Third expert's decision matrix, normalized decision matrix, and the weighted normalized decision matrix.

3rd Expert's Decision Matrix										3rd Expert's Normalized Decision Matrix										3rd Expert's Weighted Normalized Decision Matrix									
0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03	
C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	
X	6.00	6.00	9.00	9.00	9.00	8.00	8.00	8.00	X	0.43	0.43	0.60	0.58	0.58	0.53	0.53	0.63	0.62	X	0.08	0.08	0.09	0.07	0.05	0.05	0.03	0.04	0.03	
Y	9.00	9.00	8.00	9.00	9.00	9.00	9.00	9.00	8.00	Y	0.64	0.64	0.53	0.58	0.58	0.60	0.60	0.71	0.62	Y	0.12	0.12	0.08	0.07	0.05	0.05	0.04	0.04	0.03
Z	9.00	9.00	9.00	9.00	9.00	9.00	9.00	4.00	6.00	Z	0.64	0.64	0.60	0.58	0.58	0.60	0.60	0.32	0.47	Z	0.12	0.12	0.09	0.07	0.05	0.05	0.04	0.02	0.02

Table 12. Fourth expert's decision matrix, normalized decision matrix, and the weighted normalized decision matrix.

4th Expert's Decision Matrix										4th Expert's Normalized Decision Matrix										4th Expert's Weighted Normalized Decision Matrix									
0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03		0.19	0.19	0.16	0.13	0.11	0.07	0.06	0.05	0.03	
C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	
X	2	5	5	4	4	4	5	5	4	X	0.30	0.62	0.68	0.53	0.62	0.57	0.66	0.62	0.53	X	0.06	0.12	0.10	0.06	0.06	0.05	0.04	0.04	0.03
Y	5	5	5	4	4	5	4	5	4	Y	0.75	0.62	0.68	0.53	0.62	0.71	0.53	0.62	0.53	Y	0.14	0.12	0.10	0.06	0.06	0.06	0.03	0.04	0.03
Z	4	4	2	5	3	3	4	4	5	Z	0.60	0.49	0.27	0.66	0.47	0.42	0.53	0.49	0.66	Z	0.11	0.09	0.04	0.08	0.04	0.04	0.03	0.03	0.03

Later, we then used Equations (12) and (13) for the calculation of the maximum value of utility attributes constitutes PIS (V^{k+}), while the minimum value of utility attributes constitutes NIS (V^{k-}).

Later, we then separated each alternative according to their Separation from PIS S_i^{k+} and Separation from NIS S_i^{k-} values using Equations (14) and (15) (Table 12).

Later, its calculated for a decision maker Separation from PIS S_i^{k+} and Separation from NIS S_i^{k-} values were reduced to a single matrix using Equations (16) and (17) then, $\bar{S}_i^+$ and $\bar{S}_i^-$ were created. (Table 13).

Table 13. Separation of each alternative from the ideal solution and its relative closeness to the ideal solution for each 4DMs.

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉		C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉
V ¹⁺	0.15	0.14	0.13	0.09	0.07	0.07	0.04	0.04	0.04	V ²⁺	0.11	0.11	0.09	0.07	0.05	0.06	0.04	0.05	0.04
V ¹⁻	0.08	0.06	0.06	0.04	0.02	0.03	0.03	0.03	0.02	V ²⁻	0.10	0.10	0.08	0.07	0.05	0.04	0.02	0.02	0.01
V ³⁺	0.12	0.12	0.09	0.07	0.05	0.05	0.04	0.04	0.03	V ⁴⁺	0.14	0.12	0.10	0.08	0.06	0.06	0.04	0.04	0.03
V ³⁻	0.08	0.08	0.08	0.07	0.05	0.05	0.03	0.02	0.02	V ⁴⁻	0.06	0.09	0.04	0.06	0.04	0.04	0.03	0.03	0.03

Finally, we calculated the relative closeness of each alternative to the Ideal Solution ($\bar{C}_i^*$) with Equation (18) (Table 14). The brands are ranked according to the closeness coefficient, as the best alternative is closest to the positive ideal solution, and the worst alternative is closest to the negative ideal solution. Depending on the values of the proximity coefficients of the three green furniture brands (X, Y, Z), which are at the forefront with their market value in the furniture sector, Brand Y has the highest C_i^+ with 0.89 and is the most dominant alternative, followed by others. The ranking of the performances of the brands was found as Brand Y(0.89) > Brand Z(0.45) > Brand X(0.33) as given in Table 14. For determining the rank of alternatives, the higher $\bar{C}_i^*$ value indicates that the alternative is the best solution or the most preferred. That is, a larger closeness coefficient value ($\bar{C}_i^*$) means a better alternative. The green furniture brand with the largest affinity coefficient will be selected as the green brand with the best performance.

Table 14. Relative Closeness of an Alternative to the Ideal Solution and Ranking of Brands.

Alternatives	Separation from PIS ($\bar{S}_i^+$)	Separation from NIS ($\bar{S}_i^-$)	Relative Closeness from Ideal Solution $\bar{C}_i^*$	Ranking for Green Furniture Brands
Brand X	0.09	0.04	0.33	3
Brand Y	0.01	0.08	0.89	1
Brand Z	0.06	0.05	0.45	2

4.3. Sensitivity Analysis for TOPSIS Results

Sensitivity analysis, which is used to evaluate the effect of a factor on the whole model by manipulating factor weights, is of great importance for the robustness of the analysis. We changed the weights of the criteria, which could change the status of the alternatives, by giving values between 0.1 and 0.9. We applied this approach for all alternatives separately on three trips. Thus, to test the effectiveness of the sequencing obtained with TOPSIS, we performed the sensitivity analysis with three different scenarios. We used the EXCEL program for sensitivity analysis. The results are given in Tables 15–17.

Table 15. Sensitivity Analysis for Case 1.

Case 1	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	P Score	Ranking
Brand X	0.0621	0.0361	0.1023	0.0639	0.0664	0.0305	0.0260	0.0386	0.0266	0.0051	3
Brand Y	0.1000	0.2000	0.3000	0.4000	0.5000	0.6000	0.7000	0.8000	0.9000	0.1918	1
Brand Z	0.0621	0.0361	0.1023	0.0639	0.0664	0.0305	0.0260	0.0386	0.0266	0.0051	2

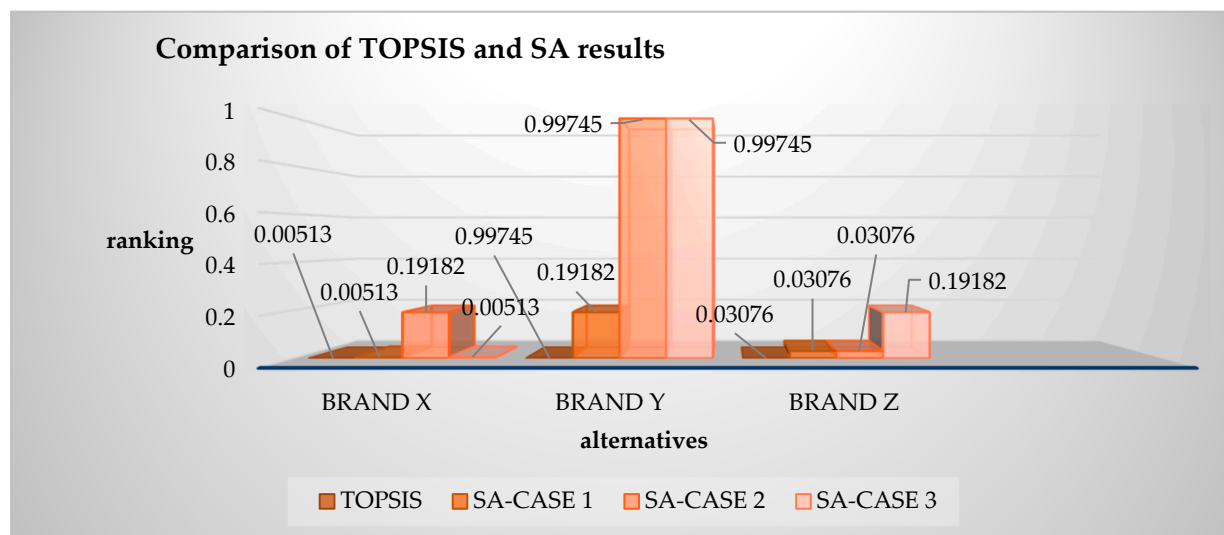
Table 16. Sensitivity Analysis for Case 2.

Case 2	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	P Score	Ranking
Brand X	0.1000	0.2000	0.3000	0.4000	0.5000	0.6000	0.7000	0.8000	0.9000	0.1918	3
Brand Y	4.4731	4.9673	1.5453	0.4759	0.3791	1.9712	0.6242	0.6293	0.5490	0.99745	1
Brand Z	0.0621	0.0650	0.0731	0.2558	0.1772	0.0267	0.0130	0.0220	0.0221	0.03076	2

Table 17. Sensitivity Analysis for Case 3.

Case 3	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	C ₇	C ₈	C ₉	P Score	Ranking
Brand X	0.0621	0.0361	0.1023	0.0639	0.0664	0.0305	0.0260	0.0386	0.0266	0.00513	3
Brand Y	4.4731	4.9673	1.5453	0.4759	0.3791	1.9712	0.6242	0.6293	0.5490	0.99745	1
Brand Z	0.1000	0.2000	0.3000	0.4000	0.5000	0.6000	0.7000	0.8000	0.9000	0.19182	2

To test the validity of the proposed method, we present the comparison of Case 1, Case 2, and Case 3 ranking results obtained by the SA method and TOPSIS method with a graph below (Figure 5).

**Figure 5.** Comparison of TOPSIS and SA results.

In a sense, the sensitivity analysis (SA) results, which are considered to provide the results of the AHP- TOPSIS approaches, showed that the green brands are sensitive to the weights of the performance evaluation factors. Sensitivity analysis shows that the results of the integrated AHP-TOPSIS approach are highly sensitive to the weight assigned to the evaluation criteria.

5. Discussion

Considering that Brand Y will be able to set a strong example for the production and marketing of green furniture for other brands in the Turkish furniture industry during the Marketing 4.0 period, we discussed the reasons for its success in green furniture production with the marketing specialist of this brand. We asked the consumers to verbally evaluate the three green furniture brands determined by the expert group according to their import and export values, within the framework of the evaluation criteria of the green furniture brands obtained with AHP. According to the TOPSIS results, we discuss the reasons why Brand Y exhibits higher green brand performance, and Brand Y is followed by Brand Z and Brand X in terms of setting an example for other green furniture brands. First of all, all of these brands attach great importance to the use of robots and software in the production of green furniture. They include artificial intelligence technology in their production to produce

defect-free furniture with less employee cost and with the least damage to the environment. They use recycled fabrics for sustainable production in the production of upholstered product groups. In their products produced with these fabrics, they also use specially printed labels to create awareness of environmental protection in consumers. There are QR (Quick Response) codes read with smartphones on these labels. In the link of these QR codes, they share detailed content that the product is made from recycled fabrics, reducing the environmental concerns of consumers. In addition, Brand Y offers its customers who buy green furniture discount coupons that they can use to re-purchase green furniture. We saw that Brand Z and Brand X have fewer product categories in green furniture than Brand Y. While Brand Y and Brand Z have the same price performance, especially in mattress production, we have determined that Brand X's environmentally friendly mattress types are more expensive. Researchers say that consumers' green product purchasing behavior is directly or indirectly affected by price sensitivity [104,105]. We cannot directly attribute the fact that the Brand X performance evaluation is lower than the other two brands, but we can give a reason. In addition, Brand Y offers the same service to its customers from many channels (retail, web, mobile, Amazon) at the same time. It can deliver all over the world within 22 days. It also carries the zero-waste label on all product packages, stating that it is green packaging. Brand X and Brand Z, who cannot offer green furniture in all their stores and on the Internet due to the lack of green product stock, cannot send products all over the world. Brand Y presents detailed information on its environmental production in a report every day on its social media page. Additionally, Brand Y sells green products to ten other brands. Brand Y actualizes information seeking, information sharing, responsibility, and personal interaction with its consumers. At the same time, Brand Y can determine which products consumers search for, which products they buy, on which platforms, the time at which they buy the products, what information they share in comments, their interaction with campaigns, and more, with green pricing directed to reducing costs and by using big data technologies and software. Another practice of Brand Y is related to promotional activities. Y Brand, for the public good, helps people in financial need and invests in social and environmental benefits. Furthermore, it unites green promotion with digitalization. This green furniture brand allocates 70% of its annual advertising budget to digital advertising. Additionally, it declares that it produces durable, environmentally friendly furniture from recyclable materials in 68% of product categories [106].

5.1. Theoretical Implications

It is very important for sustainable development that more furniture brands in the country switch to green production and sales. The research has many noteworthy contributions to the green marketing management world and the furniture industry. For instance, we bring to the literature that the Y Brand, which exhibits the highest performance among the three brands that are attentive to green furniture production in Turkey, can set a strong example for other brands while taking into account the Marketing 4.0 period's innovations. With the findings of our research, which contributes to the production and marketing of green furniture, we offer important recommendations to all furniture brand stakeholders regarding the green furniture brands enabling consumers to see what GFBPC is in Marketing 4.0, taking the necessary measures for these criteria from pre-production to after-sales stages, adopting green marketing strategies, and thus improving and increasing their performance, achieving success both locally and globally on the path to sustainable development and conducting fast green production.

Consumers evaluate the performance of brands according to many different criteria and thus enter into purchasing intention [65,107]. For the intention to result in repeated real buying behavior, the performance that the consumer assigns to the brand must be positively positive [108]. Past studies have provided information that the concept that triggers and initiates consumer behavior is the brand [65,109,110]. We conducted a case study with an integrated AHP-TOPSIS hierarchical model to see the overall value consumers place on the performance of green furniture brands in Turkey. We evaluated the performance ranking

of a limited number of green furniture brands in Turkey with the technological innovations brought by the Marketing 4.0 era.

5.2. Managerial Implications

To the best of the authors' knowledge, there is no other study in the literature that conflicts with this research. To date, few researchers have studied the determinants of green furniture brands' purchase intention based on the theory of planned behavior in general [111,112]. A study in the literature has discussed the green furniture purchasing behavior of the younger generation [65]. Therefore, the contribution of our research to the literature is to reveal the criteria for evaluating green furniture brands and to evaluate three green furniture brands according to these criteria. A limitation of the study is that few brands produce green furniture in Turkey. First of all, Turkish furniture provides a significant economic return to the country's income. The theoretical framework, in which we present comprehensively and in detail what brands should do in green furniture production and management processes, and reinforce with examples, has important contributions to guiding the relevant employees of other furniture brands.

They can see their deficiencies and create a new strategic map with the Green 4P process, which we offer theoretically for furniture brands. In addition, we have revealed with this study the importance weights of green furniture brands' evaluation criteria (Co-creation of Value (C_1), Pricing (C_2), Channel (C_3), Promotional Activities (C_4), Product Quality (C_5), Product Variety (C_6), Trust and Loyalty to the Brand (C_7), After-Sales Service (C_8), Variety of Payment Options (C_9)), with which companies can examine their deficiencies from the consumer's point of view.

With the importance weights of GFBPC obtained in the study, we allow green furniture brands to improve their performance. For example, among our experts for the study were executives from the furniture industry and they said they knew there were only 25 categories of green furniture categories. This means that the number of categories is very small compared to normal furniture categories. "Product Variety (C_6)" had a significant weight of 0.09. This shows the importance consumers attach to green product diversity. With this example, we report that the change to be made in the product category for green furniture brands will affect the green brand performances.

In addition, we explained the importance of green marketing strategies to increase Turkey's environmentally friendly furniture import and export figures in this research. With this study, we presented the green marketing strategies necessary for green and sustainable production, which not all furniture brands have yet adopted, to sector managers who do not have full knowledge of the subject. In terms of marketing, with the results of our empirical analysis on how to integrate Green 4Ps with technologies and on which criteria the brands that consume environmentally friendly furniture are evaluated from the eyes of the consumers, we explained the ways to increase the green brand performance of the other furniture brands of the sector. We think that the administrative steps to be taken according to the results of this research will be beneficial for managers, marketers, and brand owners to improve their performance in a consumer-oriented manner.

With all these contributions, we believe that our research will set an example for future studies as it is the first study to evaluate the performance of selected green furniture brands operating in the Turkish furniture industry, based on GFBPCs in Marketing 4.0 period.

We believe that we have taken a significant step for all departments in the management, production, marketing, etc. of furniture brands. With the integration of AHP-TOPSIS-SA methodologies in a case study, the GFBPCs and criterion weights we presented, all while considering the Marketing 4.0 period, we brought the performance ranking of three furniture brands to the literature. Furniture brands can hold a place in the green market and increase their income, as well as be helpful to the environment, society, and sustainable development by switching to green furniture production and marketing. With the findings of our studies in this direction, we are shedding light on the international and sustainable success and growth of green furniture brands.

With this study, in which we applied the AHP, TOPSIS, and SA methods to an empirical case, we helped the development of the implementation area of MCDM techniques and the development of hybrid models. For researchers who will analyze decision-making and sequencing problems with MCDM, we have paved the way for further research regarding these methods.

Some of the contributions of this research, in which we present the green marketing strategies of the existing brands in the sector, by evaluating the furniture industry in terms of the environmental threat of the level of carbon emissions in the world (which makes sustainable development important for all brands), is also a part of the country policy. In addition to its contribution to global economic growth, it is also the responsibility of politicians to develop policies and incentive packages that encourage sustainable and green consumption that will facilitate the living of future generations in a better and protected environment. The fact that Turkey's world-renowned brands in the furniture industry and green furniture have a satisfying diversity at the global level, and exhibit a brand performance above the green furniture brands of competing countries, will lead to an increase in the country's import and export revenues from Turkey. Politicians should increase their measures so that the furniture in almost all living spaces of a person turns into sustainable and green furniture as soon as possible so that society can live more prosperously. In this context, we have a few suggestions for politicians. For example, they should raise public awareness about the harm caused to the environment and human health in the production, distribution, and consumption of traditional furniture. They should impose obligations on the furniture sector for them to switch to the production and sale of green furniture (factories working with green energy, factories producing their energy from the sun, waste-free production, recyclable materials, vehicles turning into hybrids, and labeling and packaging systems, such as obtaining certificates issued by the state).

Bioeconomy (utilizing biological resources in the commercialization of products and services), which has recently become an important research area with sustainable development, is of industrial interest, especially in the forest and agriculture sectors, although it is policy-oriented [113–121]. Many researchers offer the suggestion that broader sustainability and green marketing research would be beneficial for the bioeconomy. This research includes the integration of technological innovations brought by Marketing 4.0 with green marketing strategies, the production of recyclable green furniture, green packaging, labeling and distribution channels provided by the use of green energy, and the necessary changes in order to become a green furniture brand [122].

6. Conclusions

With the AHP-TOPSIS results we presented in Tables 7 and 12, we found that consumers give the highest priority to the criteria of Co-creation of Value (C_1) (0.19) and Pricing (C_2) (0.19) when evaluating the performances of green furniture. This finding indicates that consumers place high importance on co-creation to value and green pricing in evaluating the performance of green furniture brands.

Green distribution channels (C_3) (0.16), which represent the second criterion with high importance in Marketing 4.0, indicate that the performance of green furniture brands can be improved by strengthening their distribution channels.

We found promotional activities (C_4) (0.13) to be the third most important green furniture performance criteria. More specifically, we found the value of the combination of special discounts, coupons, daily deals, gift cards, etc. and traditional advertising campaigns with digital advertising campaigns, digitalization of promotional applications such as content marketing and relational marketing applications, and their containing of environmental awareness messages, to be 0.13 among the other performance criteria of green furniture brands.

Product Quality (C_5) and Product Variety (C_6) weighed the same (0.09) and (0.06), indicating that these two criteria are equally important for furniture brands' performance

in Marketing 4.0. The falling behind of the other four criteria proved, once more, that Marketing 4.0 is more consumer-focused rather than product-focused.

Among other brand performance evaluation criteria, Trust and Loyalty to the Brand (C_7), After-Sales Service (C_8), and Variety of Payment Options (C_9) were weighted as (0.06), (0.05), and (0.03), respectively.

All these AHP results confirmed to us that co-creation to value, pricing, distribution channels, and promotional activities are the main evaluation criteria for furniture brands to consider increasing their brand performance in the eyes of their consumers and to compete in Marketing 4.0.

On the other hand, in the performance evaluation of furniture brands in Marketing 4.0, we found that product quality, product variety, trust and loyalty to the brand, after-sales service, and variety of payment options are not as critical.

To be a competitor, it is essential to compare furniture brands. To collect data for the TOPSIS estimation, we interviewed a total of four experts who manage various brands in the furniture industry and selected three green furniture brands. With the TOPSIS results obtained from Tables 10 and 11, among other green furniture brands, the performance of Brand Y has the highest value (0.89) in attracting the attention of consumers, followed by Brand Z and Brand X with (0.45) and (0.33) values.

In our study, when we compared the two green furniture brands (Brand X, and Brand Z) with the Brand Y within the implementation of marketing strategies with the co-creation to value efforts, in the adjustment of pricing to Marketing 4.0, in the alignment and reproduction or distribution of Brand Y; In promotional activities, we revealed that the new digital and less costly green promotional activities (Google Ads, Youtube, SEO, social media advertising, digital content production, personalized discounts, etc.) brought by Marketing 4.0 are perceived as engaging and powerful by consumers.

Although our research makes important contributions in many respects, we find it useful to share some minor limitations. One of the limitations of this study is that only a few furniture brands are producing green furniture in Turkey. Another limitation is that even the brands that are producing green furniture still do not fully comprehend how to integrate green marketing strategies and technologies. Further, the encouragement the country's politics provide regarding green production and the use of clean energy, and the consumers' awareness that they should purchase furniture that protects the environment, are not on a sufficient level.

With the findings obtained in the study, it is useful to examine the economic level, brand equity, and perception of other brands in the market and evaluate the results. Although AHP and TOPSIS methods effectively determine brand performance, the study can be expanded by taking into consideration the changing market and consumer structures. Future studies can compare the brand performances of other brands operating in the furniture industry with Marketing 4.0 and evaluate them using different criteria. The criteria for other selected brands can provide value and competitive advantage to the furniture industry. Alternatively, the criteria provided by the study can be adjusted to other sectors and green marketing research can be continued.

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Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Member	Age	Gender	Experience (years)	Position	Company/University Name
1	38	Female	9	Brand Manager	Bellona/Turkey
2	42	Female	14	marketing manager	Dogtas/Turkey
3	28	Male	3	sales expert	Cilek/Turkey
4	34	Female	6	customer relations manager	Bellona/Turkey
5	52	Male	22	Regional marketing manager	Istikbal/Turkey
6	60	Male	35	general manager	Mondi/Turkey
7	54	Male	24	general manager	Mudo/Turkey
8	28	Female	5	e-commerce specialist	Bellona/Turkey
9	32	Female	8	marketing manager/computer engineer	Bellona/Azerbaijan
10	32	Male	9	Director Operation	Istikbal/Turkey
11	41	Male	15	store owner	Cilek/Turkey
12	43	Male	15	store owner	Bambi/Turkey
13	45	Male	19	professor in marketing	Ankara University/Turkey
14	33	Female	13	postdoctoral researcher and brand manager	Gazi University/Bellona/Turkey
15	32	Male	6	store owner/Engineer of mechatronics	Karabuk University/Istikbal/Turkey
16	38	Female	15	professor in marketing	TOBB University/Turkey
17	30	Male	8	Assistant Professor	Gazi University Turkey
18	52	Male	22	store owner	Bellona/Germany
19	55	Male	24	Marketing Manager	Bellona/Germany

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