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Determining Multi-Criteria Decisions For The Selection Of Discounted Products In Sales Promotion Activities Through Promethee Method*

Satış Tutundurma Faaliyetlerinde Çok Kriterli İndirimli Ürün Seçim Kararının Promethee Yöntemi İle Belirlenmesi

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Abstract

Intense conditions of brand competition make it difficult for retailers to make decisions and manage the process of price discounts for each brand. Due to the travelers' motivations for shopping in the airport while waiting for their flights, it is a great opportunity for retailers to enhance their sales efforts. In this sense, the decisions of price discounts in each brand category become an important issue that should be solved as there are many constraints. Inventory level, shelf life, a targeted amount of sales and variables such as changes in a substitute, complementary, and competitive product prices and exchange rates are some of the factors that have significant effect. Therefore, the best decision is thought to be made by considering all these constraints and variables together.

In this regard, the purpose of this study is to develop a decision support system facilitating the determination of products to be put on special offer. Within this context, the selection of a discounted product can be considered as a multi-criteria decision-making problem that requires consideration of many criteria in an international cosmetics company operating at the duty-free zones of airports. Hence, Promethee, which is one of the multi-criteria decision-making methods, is used. In this way, it will be possible to determine which products will be discounted by considering all the determined criteria. At the end of the study, a ranking is done based on partial and full priorities for a discounted product selection to be made.

Keywords
Sales Promotion • Discounted Product Selection • Promethee Method

Öz

Yoğun rekabet koşulları, perakendecilerin karar verme sürecini ve tüm markalar için fiyat indirimi sürecini yönetmesini zorlaştırmaktadır. Havaalanlarında alışveriş yapmak, uçuş bekleme esnasında oluşan motivasyonun da etkisiyle, satış çabalarını arttırmaları açısından perakendecilere önemli bir fırsat yaratmaktadır. Bu anlamda, her marka kategorisindeki fiyat indirim kararları, birçok kısıt söz konusu olduğunda, çözülmesi gereken önemli bir konu haline gelmektedir. Stok sayısı, raf ömrü, hedeflenen satış miktarı ile ikame, tamamlayıcı ve rekabetçi ürün fiyatları ve döviz kurundaki değişimler gibi değişkenler indirimli ürünü belirlemede önemli bir etkiye sahip olan faktörlerden bazılarıdır. Bu nedenle, en iyi kararın tüm bu kısıtların ve değişkenlerin bir arada dikkate alınarak yapılması gerekmektedir.

Bu bağlamda, çalışmanın amacı, indirim yapılacak ürünlerin belirlenmesini kolaylaştıran bir karar destek sisteminin geliştirilmesidir. Bu kapsamda havaalanlarının gümrüksüz bölgelerinde faaliyet gösteren uluslararası bir kozmetik şirketi tarafından indirim uygulanacak bir ürünün seçimi, birçok kriterin dikkate alınmasını gerektiren çok kriterli bir karar verme problemi olarak ele alınmıştır. Bu problemin çözümü, çok kriterli karar verme yöntemlerinden biri olan Promethee ile yapılmıştır. Bu şekilde, belirlenen tüm kriterleri dikkate alarak hangi ürünlerde indirim yapılacağını belirlemek mümkün olacaktır. Çalışmanın son bölümünde, indirim yapılacak ürün seçiminde kısmi ve tam önceliklere dayalı bir sıralama yapılmaktadır.

Anahtar Sözcükler
Satış Promosyonu • İndirimli Ürün Seçimi • Promethee Yöntemi

One of the most frequently used sales promotion methods is price discounts made for selected products. Especially the discounts made on products that are not bought very often or that have just entered the market is an important factor. Sales promotion activities are very important as competition is very intense in many sectors; technological developments make it easier for customers to access up-to-date price list about a specific product, and customers can easily compare the pieces of information they have obtained about products. The existence of a price discount for a product that a consumer plans to purchase or try both facilitates and accelerates his decision-making process. To the contrary to regular places where consumers do shopping, airports are

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environments involving feelings such as anxiety, stress, and excitement. Due to time constraints arising from travel programs in addition to all these disadvantages, customers mostly make their purchasing decisions instantly and depending on the environmental conditions they are in (Lin and Chen, 2013). In this sense, sales promotion activities in duty-free stores stand as a factor that is as influential as the surrounding, environment, and atmosphere of airports on customers' instant purchasing decisions (Jiang, 2016).

Although the free of tax nature of duty-free stores operating at airports is attracting consumers, intense conditions of competition make it difficult for them to make decisions. In this case, attempts are made to accelerate consumers' decision-making processes, raise profits through sales promotion activities, and reach more consumers. In this context, this study will firstly provide the literature review on sales promotion activities, the importance of sales promotions in duty-free stores, and factors influencing the selection of discounted products. Then it will present the application of Promethee method, which is one of the multi-criteria decision-making methods, within the scope of the decisions for the selection of discounted brands in the duty-free retail stores of an international cosmetics company.

SALES PROMOTION ACTIVITIES

Due to the increasing variety of products and brands especially in consumer markets and the higher consciousness of consumers thanks to the internet and social media, the new customer profile consists of individuals that consider trust and originality in every product/service they purchase and experience, make price comparisons, have a high consciousness, try to persuade suppliers in accordance with their own needs, act individually, have time constraints, attach importance to ethical values in their product or brand preferences, and are socially responsible (Cummins and Mullin, 2010). The importance of sales promotion activities is evident given the intenseness of competition in many sectors and the characteristics mentioned above in the new group of customers. Sales promotion activities are short-term incentives promoting the purchase of products or services (Kitchen, 1999). They have various instruments such as coupons, instant discounts, and refund of the money (Park et al., 2013). They play an important role in retailers' marketing programs. For sales promotion activities to function efficiently, they must be attention-grabbing, encourage purchase, increase the number of visitors to the store, and accelerate purchasing decisions (Grewal et al., 1998; Lichtenstein and Bearden, 1989; Kim, 2017). Sales promotion techniques can be employed both for consumers and mediators. Promotion techniques for consumers are performed by producers and retailers, whereas the latter one is used by producers (Blattberg and Neslin, 1990). These techniques involve various instruments that are or are not price-oriented (Gedenk et al., 2006). As a result of increasing competition, price discounts have become important especially for products of similar quality and features. These kinds of practices are successful particularly on customers that are more sensitive to price (Grewal et al., 1998) who make an effort to obtain the best value at the lowest price (Brown et al., 2003).

Implementing sales promotions is one of the common ways of generating sales revenues. Some of the retailers continually perform sales promotional activities. Today, airports worldwide are focusing on generating profit by giving importance to airport duty-free shops' promotions (Park et al., 2013). As cosmetics are one of the product categories that much of the promotions applied in duty-free shops, quality and price are the two important competing factors in buying decision process (Anjana, 2018). Beauty products such as cosmetics, perfumes require high emotional involvement (Lee et al., 2012) as they are used to control one's self-image and interpreted as a vehicle of pleasure and self-expression (Cash, 1980; Featherstone, 1991). These products can involve natural substances or chemical compounds that may change one's appearance, odor, and preference. Today, customers become more self-conscious about their appearance and the quality of the products they use (Anjana, 2018). Therefore, these products can be interpreted as shopping goods which require comparison on suitability, price, quality, and style.

On the other hand, spending time while waiting for the flight and effort of gathering information from sales specialists (Kotler and Armstrong, 2012) help us to evaluate these items as shopping goods. However, in the airports, there can also be some time pressure which becomes a disadvantage for the retailers that may change the shopping behavior of consumers (Lu, 2014) and the classification of the good whether it is a shopping or convenience good. Hence, they may engage in an impulse buying behavior (Omar and Kent, 2001), which will also be highly influential on customers' instant purchasing decisions because of time constraints and the atmosphere of airports (Jiang, 2016). Although duty-free stores offer services to consumers under negative conditions caused by time constraints and big crowds (Davies, 1995; Thubert et. al., 2017), they compete with local retailers and local stores (Omar and Kent, 2001; Thubert et. al., 2017). Sales promotions are highly important for these retail stores considering that these promotions change depending on conditions and needs; many alternative products are offered together, and customers need to make their purchasing decisions in a short time. These activities play an important role in increasing the profits of duty-free stores at airports and attracting more customers to them (Park et. al., 2013). Lu (2014) revealed that the number of customers making an instant purchasing decision at the airport is higher than

that of planned customers. For this reason, promotional activities in duty-free stores are even more important for customers who make instant purchasing decisions.

Considering that price is one of the most important variables influencing a purchasing decision, retailers make product discount decisions by amount or rate or by some mixed methods. These discounts may apply to all customers, or to certain segments of customers (Chen et al., 1998). Customer groups may give different reactions to the sales prices of products, especially in the process of purchasing shopping goods. High involved consumers are engaged in a more complex decision-making process by getting involved in a deeper process of research and obtaining information about the product. Low involved consumers, on the other hand, may make their purchasing decisions in a less complex process based on the easily accessible information. In the process of evaluating price discounts, high involved consumers make their final decisions by comparing the price information in their minds with the discounts offered. On the other hand, low involved consumers just evaluate the discounts offered by retailers in a single stage without getting involved in this kind of a complex process (Chandrashekaran, 2012).

FACTORS INFLUENCING THE SELECTION OF DISCOUNTED PRODUCTS

Price discounts are important promotional efforts made by retailers to determine consumers' price consciousness and sensitivity (Kopalle et al., 1999). The price discount is an economic incentive to encourage consumers to make purchasing decisions by reducing the price of a certain quantity of food or a certain service or increasing the quantity of a product that can be purchased at the same price (Raghubir and Corfman, 1999; Weathers et al., 2015). Also, price discounts are also used to raise the curiosity of new customers and play an important role in promoting purchasing behavior (Brandweek, 1994; Blackwell et al., 2001; Fill, 2002). Price discounts are one of the important practices applied at sales points, offering a cost advantage (Fill, 2002), and influencing consumers' purchasing decisions (Yu, 2008).

Ehrenberg et al. (1994) state that discounted products also attract the loyal customers of other brands, and that after the discount period is over, consumers return to their previous brands. From this point of view, it would not be wrong to say that discounted products create short-term increases in sales. Ndubisi and Moi (2006) point out that there is a significant relationship between price discounts and the levels of interest generated by products among consumers, and that the effect created by a product rises more as price discount is applied.

Studies are reporting that price discounts considerably influence consumers' purchasing habits in retail trade (Walters, 1988), brand loyalty (Grover and Srinivasan, 1992), brand choice, purchasing time, purchasing amount, and so on (Blattberg et al., 1981). The main purpose of a discount is to encourage customers to purchase, to minimize stocks in storehouses (Alvarez and Casielles, 2005), and to have customer switches from the products of competing brands through discounted products that attract customers (Blattberg et al., 1995). Discounts can also be effective in raising sales, profits, and the number of visitors to stores. Many factors are influencing the sales of discounted products and the selection of products to be sold at a discount in retail stores. Sales data related to the promotional brand in previous years, rates of the switch to rival brands, sales data related to complementary products, and consumers' rates of changing their stores are some such factors (Walters, 1991).

The effects of promotional cross elasticity of substitute and complementary products on sales are calculated by weighting to decide on the products or brands to be put on discount (Kumar and Leone, 1988). Substitute and complementary product sales are considered, and the relationship between the price and the sale of the discounted product is revealed. If a brand is put on discount rarely, consumers may stockpile for future use. On the other hand, if a brand is put on discount very often, discounts will not benefit consumers much as they will mostly not need to stockpile (Krishna et al., 1991). Raju (1992) indicated that a decrease in stockpiling and an increase in the frequency of promotions are directly promotional. Consumers' reaction to a discount depends on the difference between the actual price and the discounted price of the product as well as their preferences (Dawes, 2004). Consumers who encounter discounted prices may embark on a quest of brands offering discounted prices in their future shopping (Karende and Kumar, 1995; Uncles et al., 2013).

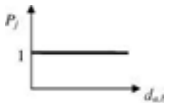
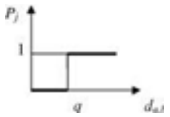
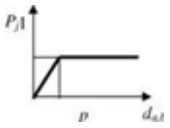
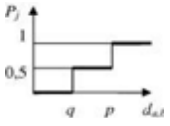
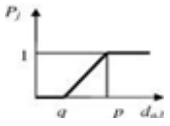
In addition to brand name, brand image, and brand quality, the store where discounts are applied, its image (Grewal et al., 1998), the frequency of promotions put into practice by the brand (Kalwani and Yim, 1992), and the market share of the brand (Walters,1991) are influential on the selection of brands that are to be subjected to discounted prices. The cross-price elasticity of brands with a high market share is higher than that of brands with a low market share. The sales of brands with a high market share influence the sales of other brands more (Walters, 1991; Scriven et al., 2017). The effects of the discounted product of a brand do not remain limited to only its products but cover rival brands as well (Walters, 1988). Kuntner and Teichert (2016) stressed that price discounts lead to a fall in the sales of similar products in rival stores. Accordingly, a price discount applied to a specific product significantly influences the sales of many products in rival stores. Another factor influencing the selection of discounted products is the variation of product choices from season to season. For example, consumers' perfume preferences may change

seasonally. Jellinek (1994) divides perfumes into four main groups: flowery, woody, fresh, and oriental and states that flowery and fresh perfumes are used in summer more often as they are refreshing and light, whereas oriental and woody perfumes are preferred in winter more often because they have a more intense scent and create a warm feeling among consumers.

THE APPLICATION OF PROMETHEE METHOD IN MULTI-CRITERIA DECISION-MAKING FOR THE SELECTION OF DISCOUNTED PRODUCTS

PROMETHEE (Preference Ranking Organization Method For Enrichment Evaluations) is a multi-criteria decision-making technique developed by J.P. Brans. In this method, the ranking of decision points is determined in two ways based on the relationship between the constraints and their importance weights: Promethee I (partial ranking) and Promethee II (full ranking). In the course of time, Promethee III involving interval order, Promethee IV involving a continuous case, GAIA method supporting Promethee method with visual methods, Promethee V dividing constraints into groups, and Promethee VI representing human brain were developed (Brans and Mareschal, 2005). The advantage of the Promethee method over other multi-criteria decision-making methods is that it allows the decision-maker to determine the priorities and weights of constraints depending on experience and expertness (Brans et al., 1986). The reason for choosing this method is that it is effective and easy to apply. Another reason is that there is a separate preference function and superiority approach for each of the selection criteria. There are six functions used in Promethee method (Brans and Mareschal, 2005).

Table 1: *PROMETHEE Method Generalized Preference Functions*

Function Type	Function Graph	Function	Explanation
Type 1: Regular Criterion		$P_j(a,b)=\begin{cases}0;\ d_{a,b}\le 0\\1;\ d_{a,b}>0\end{cases}$	This must be used when there is no preference for the decision-maker regarding the related evaluation criterion.
Type 2: U-Shape Criterion		$P_j(a,b)=\begin{cases}0;\ d_{a,b}\le q\\1;\ d_{a,b}>q\end{cases}$	This must be used when the decision-maker wants to prefer decision points having values that are above the value he has determined regarding the related evaluation criterion.
Type 3: V-Shape Criterion		$P_j(a,b)=\begin{cases}\frac{d_{a,b}}{p};\ 0<d_{a,b}\le p\\1;\ d_{a,b}>p\end{cases}$	This must be used when the decision-maker wants to prefer decision points having values that are above the average value regarding an evaluation criterion without ignoring the values below the average as well.
Type 4: Level Criterion		$P_j(a,b)=\begin{cases}0;\ 0<d_{a,b}\le q\\0{,}5;\ q<d_{a,b}\le p\\1;\ d_{a,b}>p\end{cases}$	This must be used when the decision-maker determines his preference regarding an evaluation criterion as a specific range.
Type 5: Linear Criterion		$P_j(a,b)=\begin{cases}0;\ d_{a,b}\le q\\\frac{d_{a,b}-q}{p-q};\ q<d_{a,b}\le p\\1;\ d_{a,b}>p\end{cases}$	This must be used when the decision-maker wants to prefer decision points having values that are above the average value regarding an evaluation criterion.
Type 6: Gauss Criterion		$P_j(a,b)=\left\{e^{x}/1+e^{x}\right.$	This must be used when the preference of the decision-maker is to be determined by the deviation of the related evaluation criterion values from the average.

Source: Brans et al., 1984; Vego et al., 2008

In the present study, the products of an international cosmetics company to be put on discount in the duty-free stores of airports based on various criteria were identified. The factors considered to be influential on the selection of discounted products were determined based on the marketing manager (expert) of the company. These factors are the price of the product, targeted amount of sales, inventory level, shelf life, entry and exit of the citizens of nations preferring the product with priority to/from the airport, and the prices of a substitute,

competitive, and complementary products. These criteria were determined by examining the factors included in previous studies (Walters, 1991; Kumar and Leone, 1988; Raju, 1992; Keng and Ehrenberg, 1984; Johnson et al., 1999) and considering the competition conditions and product range of the cosmetics sector and the company. The criteria and the related Promethee functions of the criteria were decided on by reaching a consensus with the marketing manager of the company. In the study, the aim was to identify which products among 20 cosmetic products determined would be put on discount in July 2016. Therefore, sales data based on a product from the last three years, average number of visitors based on nationality in the last three years, and expected price data for the substitute, complementary, and competitive products in July were used. The products mentioned above were chosen because they had been involved in the most sales transactions in the last three years. The products were coded in the analyses due to the marketing policy of the company. The criteria set, the weights of the criteria and the function preferences determined for the criteria are seen in Figure 1. The rows include a minimum/maximum preference for each criterion, weight, function type, absoluteness of the threshold, indifference (q), and preference threshold (p) respectively. The weights of the criteria were determined through paired comparison used in the analytic hierarchy process method.

Scenario1	Product Price	Targeted Am...	Inventory Le...	Shelf Life	The Preferri...	Substitute Pr...	Complement...	Competitive ...	Season
Unit	€	unit	unit	year	unit	%	%	%	y/n
Cluster/Group	◆	◆	◆	◆	◆	◆	◆	◆	◆
Preferences									
Min/Max	max	max	max	min	max	max	max	max	max
Weight	0,20	0,13	0,37	0,02	0,02	0,08	0,05	0,09	0,04
Preference Fn.	V-shape	V-shape	Linear	Level	Linear	Linear	Linear	Linear	Usual
Thresholds	absolute	absolute	absolute	absolute	absolute	absolute	absolute	absolute	absolute
- Q: Indifference	n/a	n/a	30	1	800000	0,000	0,379	0,000	n/a
- P: Preference	€ 68	25	60	2	1200000	0,200	0,670	0,100	n/a

Figure 1: *Preference Functions Chosen for the Criteria and Thresholds (Screen Shot)*

When the product price exceeds a particular level, it does not lead to a difference in the selection of the discounted product. Therefore, the third type (V-shape) function was used for the product price criterion. The preference threshold (p) for the function was determined as 68 €, which was the average price of the products.

The targeted amount of sales with the selection of the discounted product was included in the method through subtraction of the estimated amount of sales for the month from the targeted amount of sales. When the difference is big, it will be a rational decision to resort to discount in order to achieve more sales. However, when this difference is on a specific level, its influence on the preference disappears. Thus, the third type (V-shape) function was used for this function. The preference threshold (p) was determined as 25 based on expert opinion. One of the most important factors encouraging retailers to apply discounts is their intention to minimize the current stocks and reduce stock costs (Kelley and Tetlock, 2013). As the preference threshold (p) is exceeded when the stocks are above a specific level, it is not possible to choose from among the alternatives. This is true below a specific amount of stocks as well. For that reason, the fifth type (linear) function was used. The preference threshold (p) was determined as 60, and the indifference was determined (q) as 30. The fourth type (level) function was used for shelf life. A short shelf life indicates the need for quick sales. Hence, the fourth type (level) function was chosen as a gradual function structure was needed. According to the expert opinion, those cosmetic products which have a shelf life fewer than two years must be included in medium-term sales planning, and those products which have a shelf life less than one year must be sold urgently. Accordingly, the indifference was determined as (q) 1, and the preference threshold (p) was determined as 2.

The nations preferring the products are among the factors influencing the selection of discounted products. Making price discounts on the products that are preferred by nations that send a large number of visitors to the country will increase the amount of sales. In this regard, the fifth type (linear) function was used for this criterion. The first three nations preferring each product most were identified. Therefore, the sums of the average numbers of visitors from the three nations preferring each product most in the last three years were used. For the function, the indifference (q) was determined as 800000, and the threshold preference (p) was determined as 1200000.

Another factor influencing the selection of discounted products is the price of the substitute product. The price level of the product must be lowered in order to compete with the substitute product. In this sense, the value obtained from the subtraction of the substitute product price from the product price was used for this criterion. The larger this value is, the higher the tendency there is to apply a discount to raise the sales of the product. The fifth type (linear) function was used for this criterion. The indifference (q) was determined as 0, and the threshold preference (p) was determined as 0.2.

What is important in the determination of the complementary product price criterion is the necessity of making price discounts on the products with highly complementary product prices to lead the consumers only using complementary products to the main product. In this regard, the value obtained by proportioning the complementary product price to the main product price was used. The fifth type (linear) function was used for this criterion. For the function, the indifference (q) was determined as 0.379, and the preference threshold (p) was determined as 0.67.

Another factor influencing the selection of discounted products is competitive product price. The product price must be lowered to have a competitive advantage over competitive products. Thus, the value obtained by subtracting the competitive product price from the product price was used. The fifth type (linear) function was used for this criterion. The indifference (q) was determined as 0, and the preference threshold (p) was determined as 0.1.

Cosmetic products are used more in some seasons. If the products in season are put on discount, they are more likely to be preferred by consumers. In this sense, the seasons with which the products are associated were used as a criterion influencing the selection of discounted products. As this criterion was only about whether the products were in season or not, the first type (regular) function was used.

Scenario1	Product Price	Targeted Am...	Inventory Le...	Shelf Life	The Preferri...	Substitute Pr...	Complement...	Competitive ...	Season
Unit	€	unit	unit	year	unit	%	%	%	y/n
Evaluations									
Product 1	€ 76	-28	132	4	654500	-0,053	0,368	-0,263	yes
Product 2	€ 58	-30	84	4	654500	-0,379	0,483	-0,155	yes
Product 3	€ 71	-26	66	4	654500	0,127	0,380	-0,113	no
Product 4	€ 55	-17	45	4	654500	-0,127	0,491	-0,055	no
Product 5	€ 81	-61	94	4	654500	0,000	0,284	-0,025	yes
Product 6	€ 62	-24	112	4	654500	-0,306	0,371	-0,065	yes
Product 7	€ 77	48	35	4	654500	0,299	0,377	-0,195	yes
Product 8	€ 54	8	18	4	654500	0,000	0,537	-0,315	yes
Product 9	€ 79	-66	46	4	654500	0,291	0,354	0,076	yes
Product 10	€ 56	-1	34	4	654500	0,000	0,500	-0,143	yes
Product 11	€ 72	-42	24	3	968000	-0,097	0,625	-0,125	no
Product 12	€ 52	-7	26	3	968000	-0,519	0,865	-0,288	no
Product 13	€ 71	23	17	3	968000	0,282	0,366	0,014	no
Product 14	€ 51	27	19	3	968000	0,000	0,510	-0,020	no
Product 15	€ 84	-58	31	3	1384400	0,000	0,571	0,190	no
Product 16	€ 66	14	41	3	1384400	-0,273	0,727	0,197	no
Product 17	€ 84	8	16	3	1384400	0,179	0,429	-0,024	yes
Product 18	€ 66	16	16	3	1384400	-0,045	0,545	-0,121	yes
Product 19	€ 84	-57	21	3	1384400	0,179	0,310	0,071	yes
Product 20	€ 66	-34	36	3	1384400	-0,045	0,394	0,061	yes

Figure 2: *Evaluation Matrix Concerning the Alternative Products (Screen Shot)*

By the marketing policies of the company included in the study, it is decided to put two products on discount every month during the discount season. When the Promethee II results are examined, it is seen in Figure 3 that the products to be put on discount are Product 1 and Product 5.

PROMETHEE Flow Table

Rank	action	Phi	Phi+	Phi-
1	Product 1	0,2433	0,4268	0,1835
2	Product 5	0,2312	0,3979	0,1667
3	Product 6	0,2087	0,4013	0,1926
4	Product 7	0,1136	0,2578	0,1441
5	Product 17	0,1095	0,2524	0,1428
6	Product 13	0,0943	0,2447	0,1504
7	Product 2	0,0467	0,2933	0,2466
8	Product 3	0,0312	0,2183	0,1870
9	Product 16	0,0111	0,1953	0,1843
10	Product 9	0,0099	0,1931	0,1832
11	Product 19	-0,0121	0,1989	0,2110
12	Product 14	-0,0402	0,1790	0,2192
13	Product 18	-0,0416	0,1588	0,2004
14	Product 20	-0,0583	0,1438	0,2021
15	Product 15	-0,0629	0,1656	0,2285
16	Product 10	-0,0917	0,1333	0,2250
17	Product 8	-0,1419	0,1224	0,2643
18	Product 4	-0,1503	0,1048	0,2551
19	Product 11	-0,2147	0,0794	0,2941
20	Product 12	-0,2858	0,0775	0,3633

Figure 3: *The ranking results obtained through PROMETHEE II (Screen Shot)*

The products to be put on discount are influenced by each criterion at different levels. Figure 4 shows the levels at which the products are influenced by the determined criteria positively or negatively. The criteria at the top positively influence the product, whereas the criteria at the bottom negatively influence it.

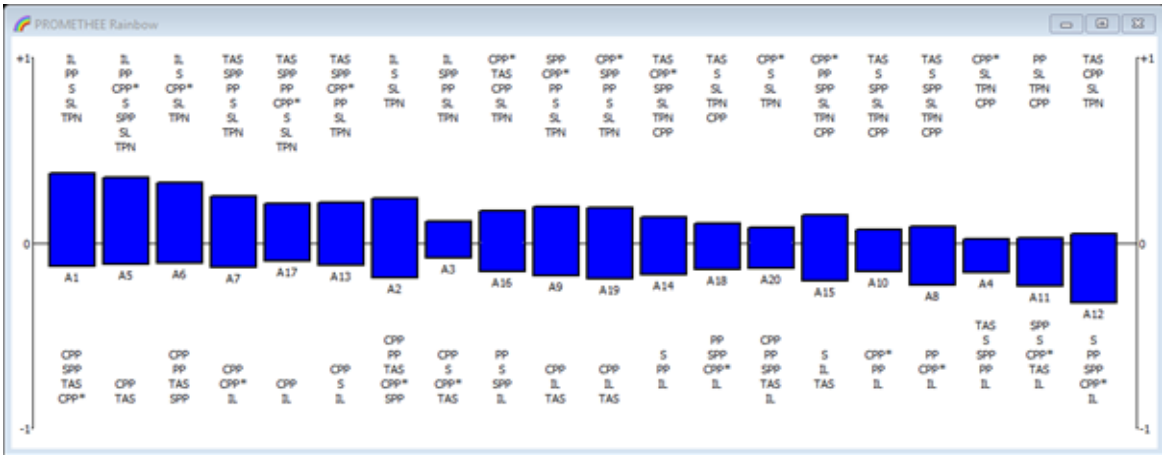
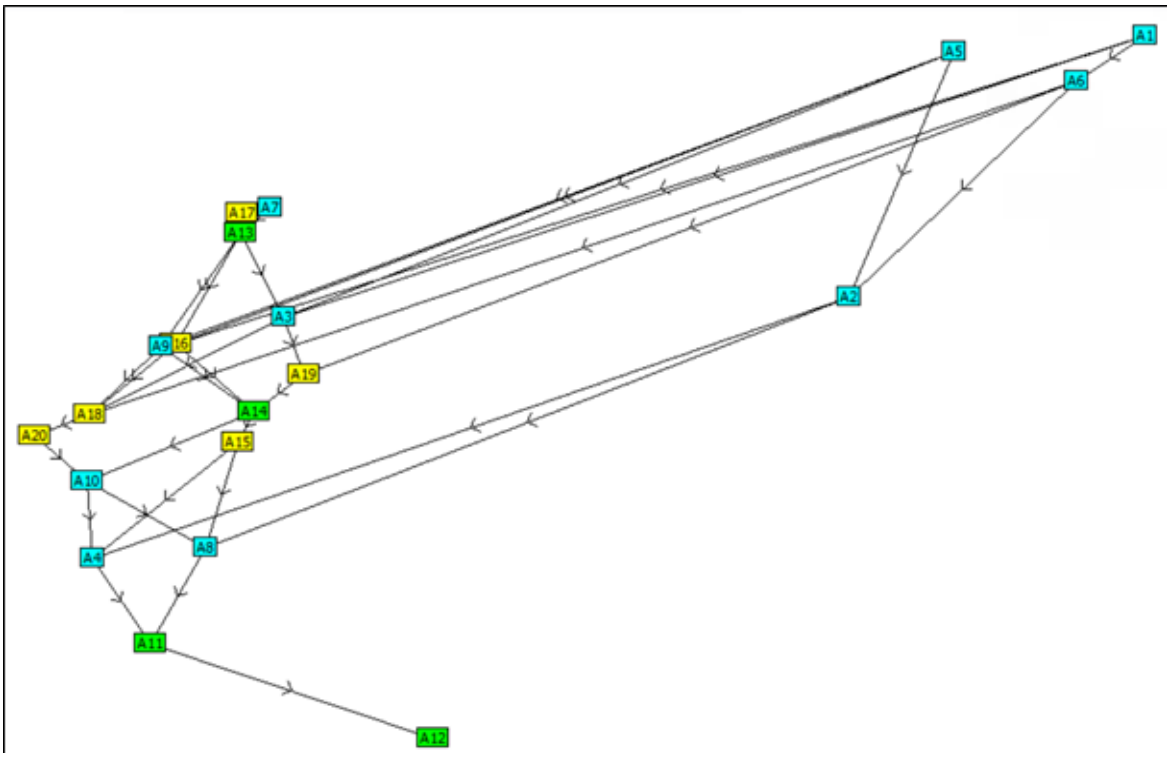


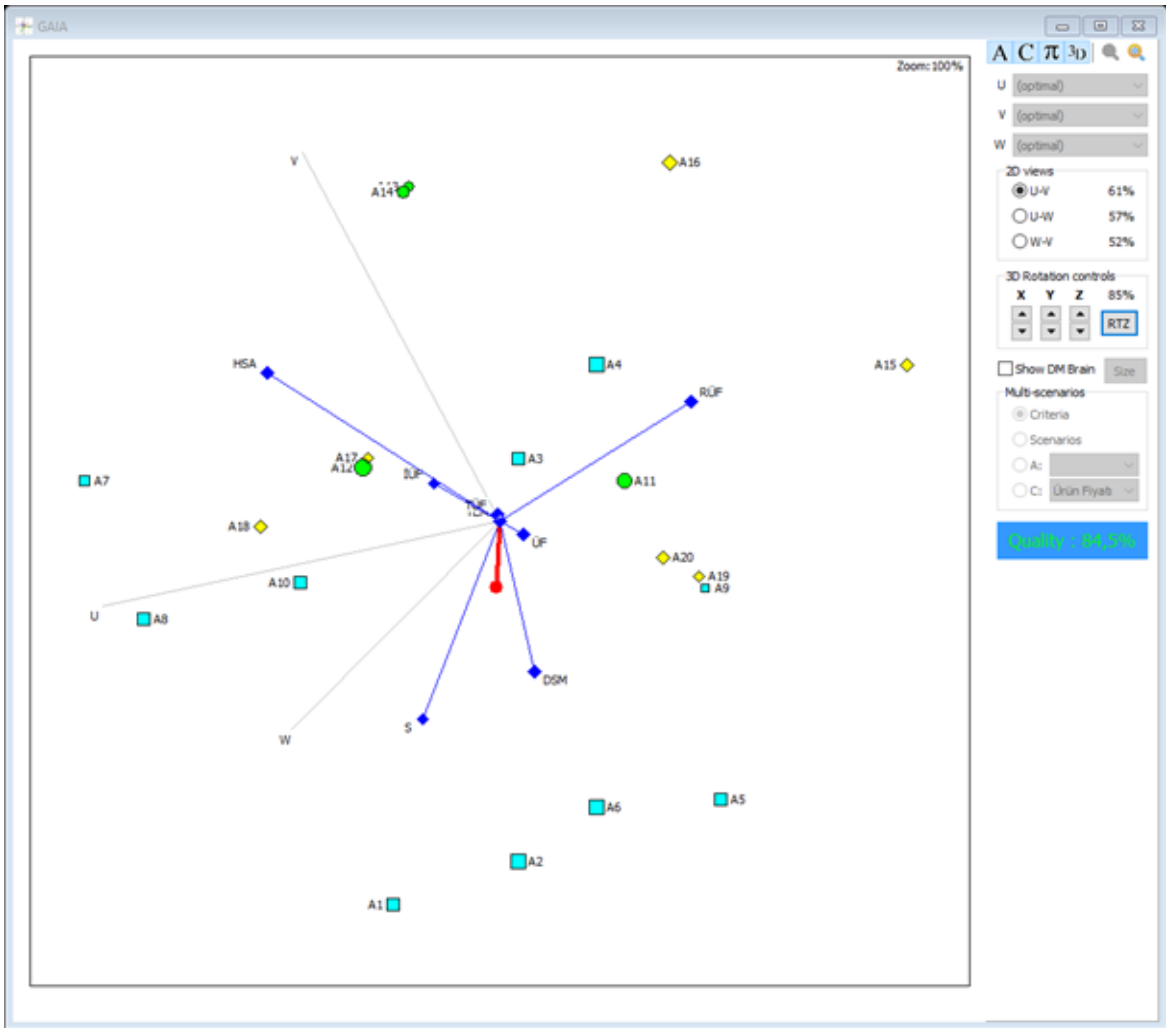
Figure 4: *The Strength Obtained by the Alternatives from the Criteria (PROMETHEE Rainbow) (Screen Shot)*

* PP: Product Price, TAS: Targeted Amount of Sales, IL: Inventory Level, SL: Shelf Life, TPN: The Preferring Nation, SPP: Substitute Product Price, CPP: Complementary Product Price, CPP*: Competitive Product Price, S: Season

The ranking results obtained through Promethee II are represented in a network structure in Figure 5. A1, A5, and A6 are seen to be the most preferred products.



PROMETHEE and GAIA methods belong to the family of the outranking methods (Mareschal and De Smet, 2009, Yan and Ming-gui, 2014). GAIA (Graphical Analysis for Interactive Aid) provides a rich descriptive analysis that complements the PROMETHEE rankings and helps the decision-makers to assess the better preferences (Ilangkumaran et al., 2013). GAIA starts from a multidimensional representation of the decision problem with as many dimensions as the number of criteria, and a mathematical method called the Principal Components Analysis is used to reduce the number of dimensions while minimizing the loss of information (Visual Promethee, 2013; Kabir and Sumi, 2014; Glavic et al., 2017). GAIA analysis is reliable when the quality level is above or close to 70%. In GAIA, it is important to note that the key feature of such plots is the direction from the origin (Belton and Stewart, 2002). In Figure 6, the direction from the origin towards the plotted position of Alternative 1 (A1) is linked with the directional axes of season and inventory level. Also, it is seen that the criterion lines of inventory level and season are in the direction of the red selection line. A1, A2, A5, and A6 products are seen to be in the direction of this selection arrow.



CONCLUSION

Sales promotion activities are practices of communication having quite an important place among the marketing activities of companies. These activities, which especially lead consumers to purchase behaviors (Krishna and Zhang, 1999; Huff and Alden, 1998; Bawa and Shoemaker, 1987; Liao et al., 2009), can be put into practice as a result of the efforts of retailers or the common efforts of retailers and producers. One of the most frequently used methods among sales promotion activities, which have many different forms of application, is price discount (Fill, 2002) applied to selected products.

Duty-free shops are one of the most important areas for retailers to increase sales revenues as the number of travelers are on the rise. However, it starts to become a very critical issue for retailers to decide the product to which a discount will apply. Although airports are environments involving feelings such as anxiety, stress, and excitement due to time constraints, sales promotions, especially price discounts, become very essential to motivate customers for making their purchasing decisions instantly (Lin and Chen, 2013). It can be seen that cosmetics like perfumes are one of the most discount-applied categories in duty-free shops. This product category can be evaluated as a shopping good due to its high involvement nature (Lee et al., 2012). Nevertheless, the general atmosphere of the airport under negative conditions caused by time constraints and big crowds (Jiang, 2016; Davies, 1995) may change the behavior patterns of the customers and price discounts may motivate them to give instant purchase decision regardless of the type of the product.

The present study aimed to create a decision support system by digitizing the decision-making logic of the marketing manager of the company included in the study concerning the selection of products to be put on discount. While creating the model, the conditions prevailing the period the data dated from were taken into consideration. The inclusion of many criteria influencing the marketing manager's selection of discounted products in the model, decision support system applied will prevent him from making the wrong choices. As the conditions and constraints may change occasionally, it becomes very important for the retailer to give the decision based on a multi-criteria model. Also, the fact that the model takes the conditions prevailing the period the data date from as basis will enable the company to have an advantage over its competitors

and have a bigger share in the cosmetics market in the period subjected to projections. The Promethee software used in the study allows making decisions under new conditions when any change occurs in the criteria (e.g., change in the competitive product price, any possible problem in inventory). As the results show, the system can choose the most feasible two products under given constraints. In this respect, the decision support model created in the study can be useful for retailers in implementing pricing strategies as an instrument providing decision-makers with flexibility and ability to make quick decisions through the use of different parameters in different sectors or creation of different scenarios to show the changes in preferences under different conditions. This model can also be developed for the other retailers by adjusting the weights of the variables according to the conditions of the industry. The weights determination can also be improved by machine learning technology which allows computers to produce decisions that are emerged from the past data.

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