

## **Mapping of Soft Drinks Preferences from the Air Travel Customers' Viewpoint**

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### **Abstract**

The purpose of this study is to design and develop a marketing planning model for the development of tourism industry in start-ups and innovative Iranian companies. This industry, which is one of the most dynamic economic activities of the present era, plays an important role in sustainable local development. The research method in this research is applied. It is also a type of field analysis because the data collection tool is a questionnaire and the researcher has collected information through the respondents. The statistical population of this study is all the officials of the executive bodies in relation to the tourism industry and employees and private companies in this regard. Due to the infinity of the statistical population and its large size, cluster sampling is available and the sample size is 14 people. The results of the study were analyzed through version 10 of Maxqda software. In the results, causal variables include environmental attitude, economic and environmental conditions, competition, tourism planning and social capital.

**Keywords: planning, marketing, tourism industry, start-ups and innovators, economic cycle.**

## **1. Introduction**

In general, success of a provided product in a target market is possible. According to the principle of knowing the market and knowing who our customers are and what they want and being able to get a good position among them (Kotler & Keller, 2009, p.243). On the other hand, the consumer's perception of the products has a direct effect on their decision of buying or using them. Therefore, product positioning is considered necessary and inevitable. The concept of positioning is to design the product in a way that they get a prominent and exponential competitive position in the minds of the target customers (Kotler, Armstrong & Opresnik, 2018, p.105). Product positioning expands in two areas. First, determining the position that a product or a brand has in the minds of the customers according to their needs and to competitors' products or brands, and in second step, how the firm managers decide to achieve the target position, so the idea of positioning includes competitive considerations and paying attention to customer needs (Aker & Joachimsthaler, 2000, p.315). The decision to determine the position of a product is a strategic decision and has some implications that the company relies on them to know how to design its goods or services and can determine other elements of marketing strategy accordingly. Positioning methods are divided into two main groups, including statistical methods such as multidimensional scale, factor analysis, cluster analysis, differences analysis, similarities analysis; and graphical methods such as perceptual maps and preferences maps and common point maps. In researches, both methods are usually adopted and executed as a complement. In the meantime, by examining and comparing the perceptual and preferential judgments, it is determined that when the consumer needs are due to preferential rules, it has a higher predictive validity for purchasing from the consumer needs due to perceptual judgments. Before making a preferential judgment, consumers imagine the benefits that the products offer them. This information is vital for developing a new product or modifying an existing one (Van Kleef, Van Trijp & Luning, 2005, p.185). Therefore, preferences map is very applied tool. Preference mapping is a set of multivariate statistical methods used to make connections between the consumer acceptance and the product features and to develop a deeper perception of the market (Meilgaard, Civille & Carr, 2007, p.56). The outcome of this method is

generally graphic, which is used to study the product space and preference patterns visually (Lawless & Heymann, 2010, p.112). The characteristics of a product are usually measured by using instrumental analysis or descriptive-sensory analysis in order to gain a perception into the key features that affect the overall interest. The gained information can be used to guide the product development because it helps to reveal where a new product is on the market or how to improve existing products to increase demand (Van Kleef, Van Trijp & Luning, 2006, p.94). Preference mapping techniques are key tools in portfolio management that use consumer and sensory information to identify motive characteristics of interest (MacFie, 2008, p.123).

After years of gaining experience in the airline industry, the managers and operators of this industry have realized that the role of customers in the profitability of this industry is one of the key elements. Meanwhile, the issue of the customers' satisfaction in serving food and beverages, especially in long-haul flights in this business, is very significant. This issue is so important for travelers whom they pay several times more for in-flight meal items than when they purchase the same product from a restaurant, fast food or bar store. However, there is still a demand for these services (O'Shea, 2018). On the other hand, in Iranian airlines, due to legal and even religious restrictions, it is not possible to serve some food items and beverages, including alcoholic beverages. Therefore, the need for alternative products gives these airlines the requirement to provide and introduce creative and customer-friendly products, especially to foreign customers and tourists in order to move in the direction of creating a competitive advantage and compensating for the decline in the customer satisfaction as well as increasing the income and create wealth. In the meantime, the problem is which beverage focusing on what features will be suitable for serving customers in flights. In this way, we will use the preferences map, which is a branch of product sensory analysis .

## **2. Literature review**

The rise of what is considered as flight catering occurred in the 1920s when Imperial Airways began offering tea or coffee on its aircraft in the United Kingdom (O'Hara & Strugnell, 1997, p.82). However, in-flight meals were started by the Airline Union in 1927 and did not include more

than cold nourishments such as salads, ice cream, cheese, alcoholic beverages, and mineral water (Franklin, 1999, p.54). These services continued until the mid-1930s, when hot eatables became available on a regular basis. In 1934, Imperial and Qantas were forced to combine their service operations with hot meals in insulated containers during intercontinental flights from London to Brisbane (Bruce, 2001, p.17). Then, in 1936, the larger food storage facility on the CCTV aircraft was designed by Imperial, which provided a convenient way to serve special foods. In fact, the airline's first "catering center" was created by this company (Wright, 2001, p.238), and accordingly, it made food and beverage serving an important part of all services in the airline industry. The use of modern and advanced equipment for in-flight catering began in the mid-1950s, and the interior design of the Boeing 737 includes eat and drink equipments or tools to enrich the customer experience. The first aircraft stoves and refrigerators were installed on Boeing aircraft. With this installation, many airlines began offering services ranging from hot and cold foods to soft drinks and alcoholic beverages. Since then, in-flight catering has become a multi-million dollar business and continues to grow. Most airlines have paid close attention to in-flight nourishments, so they have established their own catering to airport-based units in response to growing customer needs. During the 1980s, most airlines had their own lines of catering (Dana, 1999, p.102). This changed, however, in the early 1990s when in-flight catering was outsourced to specialist catering companies. Gate Gourmet, Alpha Flight Services, and LSG Chefs are examples of multinational catering companies that have been responsible for preparing countless items for many airlines. These companies increasingly have food industry experts and chefs to design the right menus for the market. Over time, high operating costs reduce the ability of airlines to focus more fully on other catering requirements (King, 2001, p.116). Researchers who have so far targeted customers in the industry, have studied various aspects of air catering including marketing, human resources, health and quality of food and service quality in air catering. It can be mentioned to the study of Driver (1999) in developing the role of hospitality in airline marketing practices and activities, the study by Writz et al. (2008) on the strength of front-line staff relationships as an important driver of customer loyalty, and the study of O'Hara and Strugnell (1997) on the contents and size of the air

catering tray. Jones (1995) focused on the creativity of flight attendants for new food products and services. Dana (2000) suggested that airlines should provide snacks to meet dietary or religious needs, as well as use advanced meal reservations to attract more passengers. The research of Eric and Laws (2005) showed that passengers during long-haul flights are more concerned with the experience of excellence and good quality of meals on the flight, and therefore demand a wider range of foods that are safe to eat. Han et al. (2019) revealed the effect of different dimensions of food and beverage service, including food, decoration and serving, on the intention to fly again, and showed that better organization of food service makes prices seem reasonable and the airline brand image be appropriate. In addition to the service quality, Romli et al. (2016) also examined the quality of waste collection and provided solutions to address the identified weaknesses. Also, with the expansion of the concepts of environmental protection and green marketing, aspects of waste reduction and waste of food and beverages have become important in order to indirectly increase customer satisfaction with the services provided (You, Bhamra & Lilley, 2020.)

About sensory analysis in the food and beverage industry with help of the preferences map, it has been in a wide range of products from natural ingredients (such as Oduro et al. (2021) and Mahato et al. (2022) studies about milk and Sirimuangmoon (2022) disquisition on pineapples) to processed foods (like Dooley et al. (2010) investigation connected with vanilla ice cream and Mongi and Gomezulu (2022) exploration around beef sausages) and from industrial ones (for example, Adjei et al. (2020) study related to wines) to experimental ones (for instance, Paulsen et al. (2012) research apropos of salmon–sauce and Maleki et al., (2020) examination on cooked rice). In this kind of study, an experimenter can have a considerable control over the products under investigation. While in many cases, he chooses products that are inscribed in the sensory space and then the overall interest is measured. Many researches have been focused on specific features of products that have been manipulated. For example, in a study on pudding, experimenters adjusted samples by changing materials in three different dimensions: thickness, fat, and softness, while trying to keep other characteristics, such as color, constant. Such manipulations of the samples can be systematically followed by a pre-selected experimental design, as in the study by

Yackinous et al. (1999) in which the experimenters followed a three-by-three factorial design that systematically manipulated the salad sauce into three levels of fat and three levels of garlic, and finally nine different samples were tested.

Concerning variables, flavour was considered in almost all of the studies. But the appearance (see Geel et al. (2005) disquisition), the aroma (see Martinez et al. (2002) research), the combination technique of the ingredients (see Meullenet et al. (2007) study) and the mouth-feel (see Richardson-Harman et al. (2000) research) have also been well considered in many reports. Numerous studies have also related overall interest of instrumental variables such as the studies of Alves et al. (2008), Ares et al. (2006), Berna et al. (2005), Harker et al. (2008), Pham et al. (2018). Furthermore, development of the preference map may be related to an interest in a particular characteristic such as component construction in Ares et al. (2006) study. Thybo et al. (2003) examined children's preferences for apples. They modeled not only sensory, chemical, and instrumental criteria, but also demographic information, including (age, gender, etc.) and behavioral data (such as apple consumption amount), flavour and appearance preferences. By preparing a map to food appearance preferences along with behavioral data related to appearance and objective criteria, the interdisciplinary relationships can be identified and used to provide perceptions that explain different priorities among children. Often, overall interest is related to descriptive sensory information. For a clearer view of these conditions, we can see the researches of Meullenet et al. (2001) and Yang et al. (2015). It is also possible to link the interest to the timeline of a feature. When surveying strawberry jam, Alves et al. (2008) had judges to evaluate the taste of strawberries, pickles, and sweets under volume-time. Maximum volume, time to maximum volume, total time and the surface under the curve showed significant differences between the jam, and these criteria where it relates to the consumers' interest and satisfaction. In this case, the mean values for all criteria were associated with the most popular samples.

Acceptance of products depends on more than its flavour. Packaging a product is important for purchase and can be related to desiring too. In a study on cheddar cheese, descriptive panelists were trained in addition to sensory criteria of appearance, flavour, aroma, and texture to evaluate the characteristics of twenty packages, including shape and function.

Consumers were asked to rate their interest in packaging and taste. The result reveals the preferential models of sensory features and packaging specifications that were most attractive to consumers. Although instrumental criteria, alone, can be used for the preference map. Such methods are risky for missing values and measurable sensory features. For instance, both instrumental and sensory criteria were needed to predict consumers' interest in the texture of Dulce de Leche products. In this study, consumers evaluated overall interest in the texture. The trained sensory panel examined texture features and made instrumental measurements. Although, specific instrumental criteria were associated with overall interest, but they did not tell the whole story. For example, instrumental criteria and sensory rankings for solidity were highly correlated, and some instrumental criteria for solidity could be used to predict desire as well as sensory solidity scores. Viscosity, on the other hand, was not related to any of the instrumental criteria. However, it is important to remember that even when consumers are asked to focus on a particular set of features, other irrelevant features can be effective on their evaluation. For example, Bagchi and Nair (2017) asked consumers to rate their interest in the creamy texture of pudding samples with very different fat thickness and subtlety. Descriptive analysis of appearance, texture, mouth-feel and flavour was also performed on these samples. Even if consumers were directly guided to ranking their interest in texture, the results show that smell and flavour characteristics affect the preferences .

### **3. Research Method**

In terms of purpose, this research is applied, and it is done to segment the market and to achieve better product features. In addition, its method is analytical. The statistical population of the study are all air travelers over 18 years old who have experienced long-haul flight at least once. According to the table proposed by Hough et al. (2006) in the sensory analysis of product acceptance, which recommended the minimum number of testers and with observance to the margin of confidence of the missing data, a sample of 130 respondents were selected. Product test criteria for beverages were extracted by Zimet qualitative method and mapping the customer's mental value. These characteristics include flavour, aroma, appearance and mouth-feel (Fayazi et al., 2021, p.11). The sample group of customers is surveyed by using a 9-point Likert

scale questionnaire about the dimensions of these four characteristics and also the overall interest in the product from very unpleasant to very pleasant. In this regard, the judges, after testing each sample of the products, reported the overall interest of that product and also the degree of pleasantness of each product feature. The number of tested products according to MacFie's viewpoint (2007) in relation to the minimum analyzable samples, were acceptable. Therefore, 8 prototypes of proposed soft drinks by domestic suppliers, were selected. Also, each judge should test at least 75% of the products (In this study, equivalent to 6 basic products) to be able to use his/her questionnaire. Therefore, 123 questionnaires can be used from these questionnaires, and the information has been completely fulfilled. Thus, the answer rate to the questions is equal to 95%. Mathematical analysis and structuring has been done by XLSTAT software version 2018, and a multi-step method based on the steps of internal and external preference mapping has been used.

In this test, each option was nameless and was coded with random number (due to neutralizing the halo effect of the product name and brand). In this section, each respondent completed a screening questionnaire after drinking product samples according to his/her opinion. The scheme used in this test is the central location test (CLT), accordingly the scope is Emam Khomeini airport of Tehran and its just landed passengers. The research was conducted in spring season and the room temperature was 19 ° C. In this test, instructions such as water consumption between the two products and usage of same glass cups size and the same sample volume (10 ml for each sample) and the same temperatures of 4 ° C for all beverages were observed. Also, until the end of the test, the name and the brand of the product remained unsaid for the respondents.

#### **4. Results**

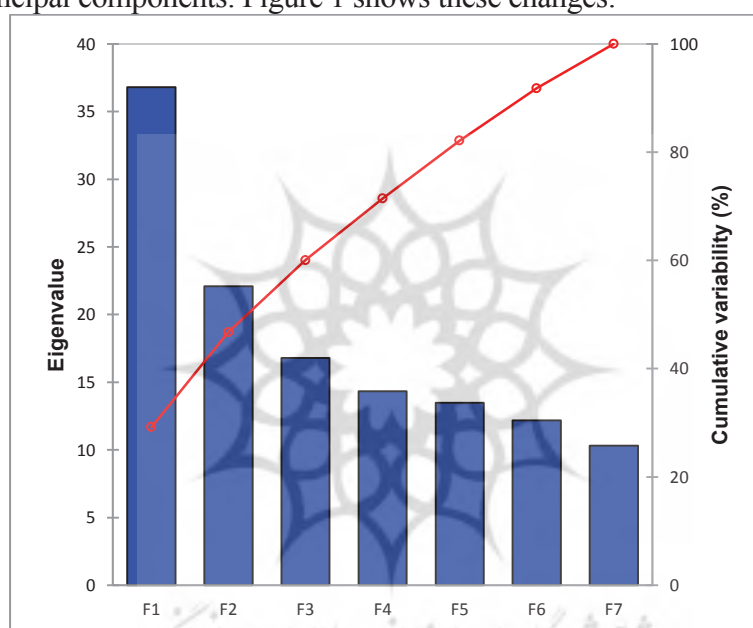
Before starting the main steps, according to the existing basis of analysis, the adequacy of the sample size was measured. In this direction, calculated values of K-M-O and the Bartlett's test of sphericity were 0.53 and 0.003, respectively, indicating that the sample size is acceptable for the analysis. Also, in principal component analysis with a reduction in the



dimensions (rather than the modeling) normality is not a obligatory assumption (Jolliffe, 2002, p.78.)

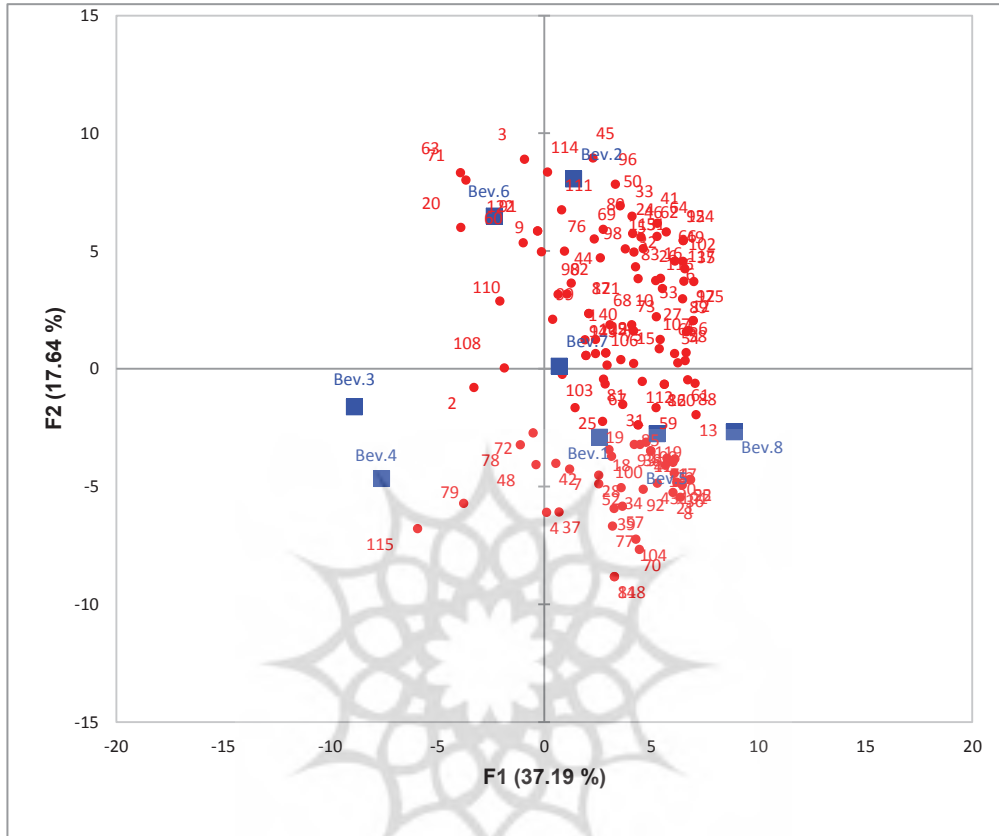
*1-4. Internal preferences map*

Firstly, principal component analysis of the respondents' overall interest toward the tested options was done. In this way, the diagram of changes in specific values (pebbles) was drawn to determine the number of principal components. Figure 1 shows these changes.



**Figure 1: Pebble diagram for extracting the main components in the internal preferences map**

Considering that the curve in the F2 component has a slight angle change and components F1 and F2 together cover more half of the changes. These Components can be used, and the others can be discarded with caution. Therefore, internal preferences map can be drawn in two dimensions with good approximation. Based on this, the internal map of the respondents' preferences around the tested beverages is drawn. This map has been shown in Figure 2.



**Figure 2: The internal map of the respondents' preferences around the tested beverages**

As can be seen in the figure, based on the criteria of density and position proximity of the variables to each other, which is evaluated in such maps. Beverage 5 is among the highest density of the respondents' overall interest. Also, beverage 1 and beverage 7 and the others are in the next ranks, respectively.

*4-2. External preferences map*

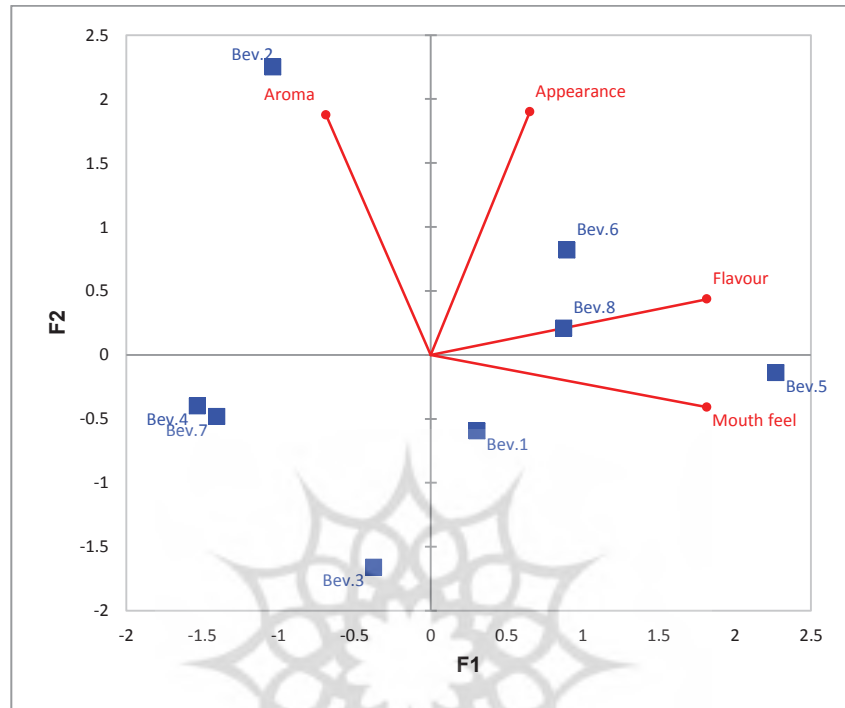
At first, the principal components of features were analyzed. Thus, the four main components were extracted. Then the correlation degree of each variable with these factors calculated. Results have been revealed in Table 1. As can be seen, about the primary significant factors,

variables that have highest correlation with F1 are the flavour and the mouth-feel, and F2 has the highest correlation with the appearance and the aroma of the beverage.

**Table 1: The correlation degree of each variable with factors**

	F1	F2	F3	F4
Flavour	0.881	0.184	0.175	0.398
Aroma	-0.373	0.772	0.519	-0.080
Mouth-feel	0.881	-0.172	0.184	-0.394
Appearance	0.356	0.801	-0.499	-0.097

The bioplat diagram was then drawn based on the two top components. As shown in the figure 3, for example, the direction of the flavour and the mouth-feel vectors are towards the Beverage 5, which means that the greatest influence on the respondents' interest in this product has been made by these two variables. Other products and the effective variables in them can be identified from the plot.



**Figure 3: Biplot of sample products and influential variables in judgment**

At the next step, in the framework of hierarchical analysis, customers are classified based on similarity of liking, variance, and distances between respondents. Figure 4 shows this clustering in the form of a customer segmentation tree. We also used the heterogeneity of clusters criteria and R2 principles in determining of the appropriate quantity of clusters. Thus, the customers are divided into three general clusters.

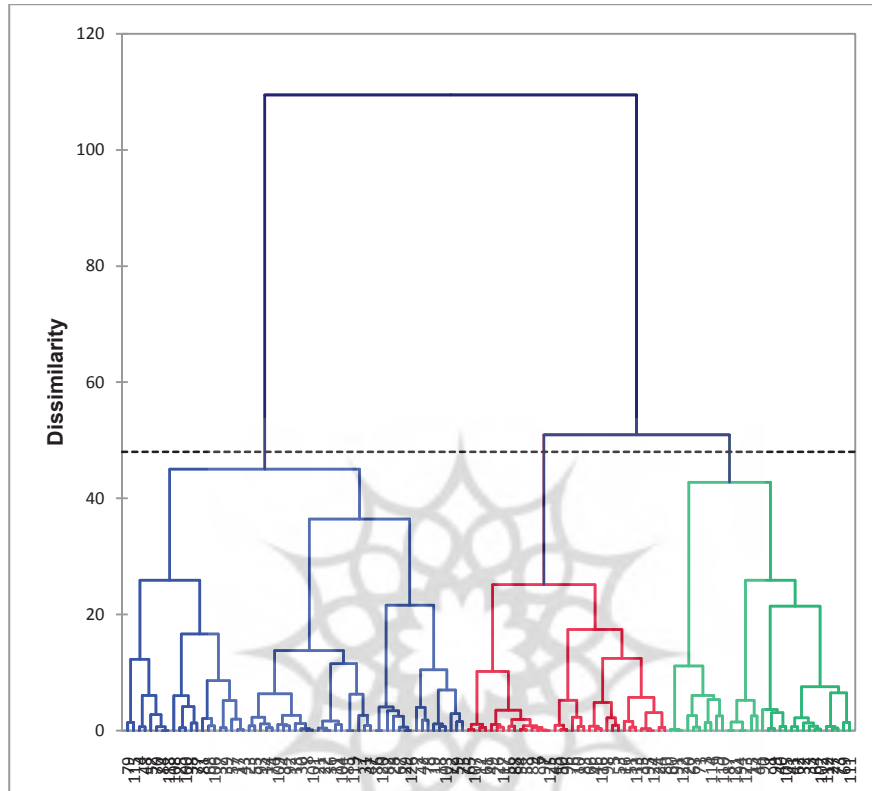


Figure 4: Cluster tree diagram

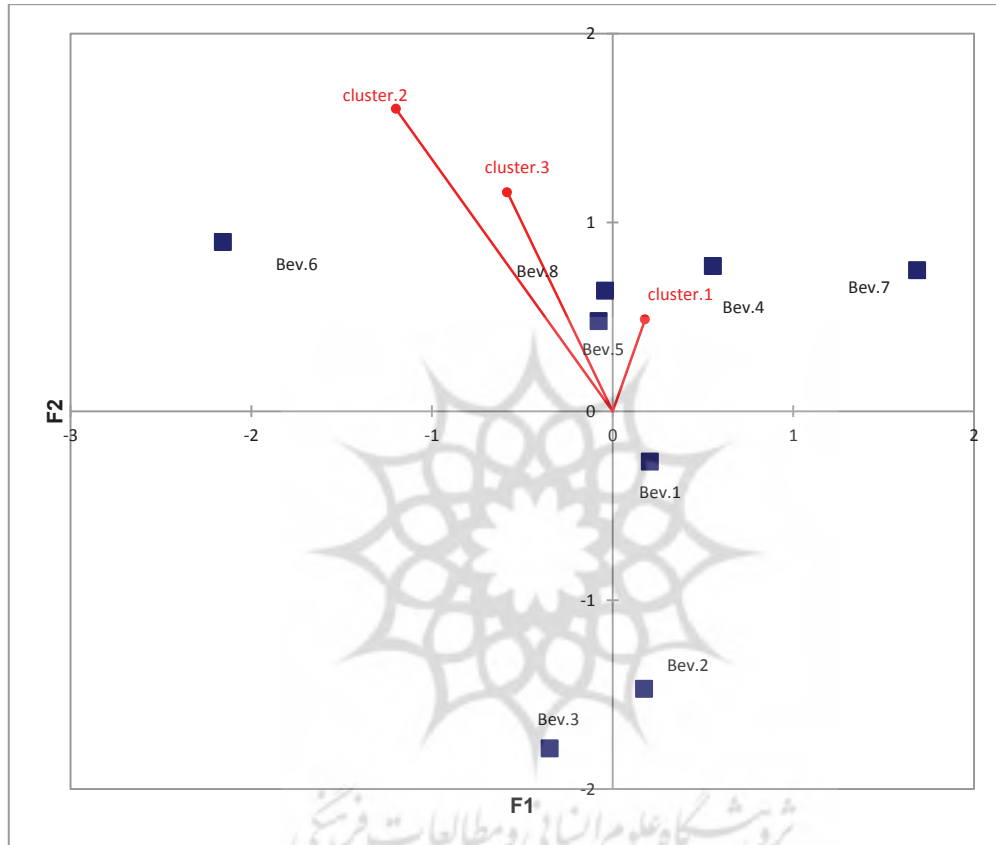
The variance analysis (ANOVA) test was performed on the three clusters to ensure the significance of the three clusters. According to Table 2, the variance homogeneity of all three clusters is significant, and their existences are proven.

Table 2 - ANOVA test on three clusters of respondents

Y	DF	Sum of	Mean	R <sup>2</sup>	F	Pr (> F)	p > 0.05
cluster.1	5	6.852	1.371	0.021	0.054	0.948	Yes
cluster.2	5	4.795	0.959	0.315	0.238	0.389	Yes
cluster.3	5	6.261	1.215	0.132	0.381	0.701	Yes

Using the results of the principal component analysis as well as clustering obtained from the hierarchical method, the external map of

preferences can be drawn. This map has been shown in Figure 5. This figure illustrates the tendency of each cluster to each tested product.



**Figure 5: External preferences map of tested products and clusters of respondents**

According to the map, beverage 5 is almost welcomed by all three clusters of the customers. Beverage 8 is more popular among clusters 1 and 3. Also, beverage 4 is popular among cluster 1 and the taste of the cluster 2 is somewhat close to beverage 2. Similarly, the situations of the other tested products can be seen in the preferences map. Of course, it should be considered that the comparative estimation of market segment volume in each cluster is comparable based on the vector size of that cluster. Based on the shown external preferences map, it is clear that cluster 2 is larger than clusters 3 and 1, and also the market in cluster 3 is larger than cluster 1. Also, matching the

external preferences map with the customer contour is shown in Figure 6. The customers' desire is shown in the colour scheme.

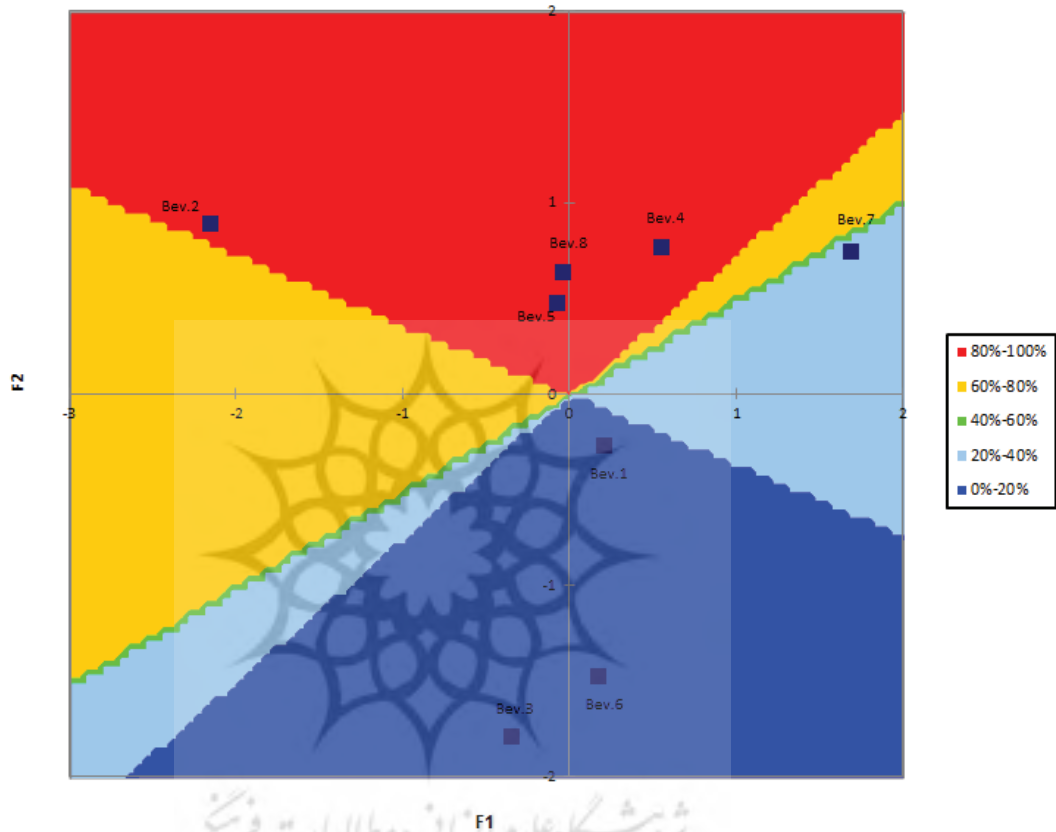


Figure 6: Combined map of customer contour and external preferences of tested products

This colour scheme shows a much greater desire of customers to beverages 5, 8 and 4, which are located in the red range. Beverage 2 is located on the border between the two areas, which puts it in a lower rank than the previous three products. The rests of the products are located in areas of low interests.

## 5. Discussions and Conclusion

This study generally aims drawing market space of the soft drink consumption in the situation of air travel and positioning the

beverages by customer preferences to provide products, which are favored by the target market of Iranian airlines. The results, totally, show that product 5 has a good level of liking and preferences among the respondents and so, many of customers tend to it. More interestingly, by clustering the customer community based on the heterogeneity criteria and classifying them into three separate clusters, this product has favored by all three clusters of customers and they have shown interest in consuming it, which indicates that it is a suitable choice for the entire target market. However, in prioritization, the interest in cluster 3 is the highest, followed by cluster 1 and then cluster 2. Other remarkable point is although totality of the product is preferred and liked by customers, the main advantages that make this product stand out for customers are the flavour and the mouth-feel features after the product is tested. However, emprises can be done to optimize and improve the product 5 to be strengthened in two other characteristics. Therefore, this product is recommended for serving to the market in general with revisions in design to improve the appearance and aroma. Furthermore, other applications for airlines can be offered from research in addition to introduced beverage (with the desired modifications). (1) Since, foreign travelers are significant segment of the target market, For more customizing the product around them, tools such as penalty analysis and check-all-that-apply (CATA) in the optimization step can be used on just foreigner samples as a way to more accurately reveal weak or acceptable points in the compounds of product 5 and the extent of manipulating of these compounds to customizing the features. (2) Airlines can combine the demographic information of their customers in terms of age, gender, education, with the basic sensory information resulting from the research to obtain more segregated analysis in sections of target customers and will be able to get a drink serving pattern based on their fleet route schedule on their destinations. (3) Airlines can use statistical significant tests on these sections in the consumption of the target beverage and complete the beverage serving pattern. In this regard, methods of comparing the mean between groups, including least significant difference test, Duncan test, Tukey test, Dante test and Newman Coles test, will be helpful for aviation industry consultants. (4) Iranian airlines, by taking the origin and destination of the made



trips and based on different airline business models, including charter, low-cost-carrier, commuter and network, can adjust the service volume of the target drink. This provides a important advantage for Iranian airlines due to the fact that some foreign airlines have eliminated serving drinks in order to reduce their costs in some of these models. (5) Flavoring with extracts, adding ingredients or offering a mixed cocktail of drinks is a common way to achieve customer satisfaction by focusing on satisfying their secondary level preferences such as curiosity, the sense of different experience, the sense of a native culture acceptance, and so on. In airlines, according to this approach, based on the offered drink, derived products with the aim of satisfying such needs and also diversification of services according to the suitability of the target customers can be provided.

Finally, suggesting the following topics for future research can help expand and deepen the results and concepts of this research:

-In the present study, we tried to ignore the halo effect of the brand and product name on the customer's mind. To make an accurate judgment about the focused features of the product. It is suggested that a similar research be done with the same conditions but by informing customers about the product name and brand of the manufacturer, and thus the effect of the brand halo on customer preferences and the amount of power and direction to be investigated.

-In this research, simple statistical scales were used in product testing and data collection. It is suggested to use the fuzzy method of collecting preferences in order to increase the accuracy of similar research.

-This research was conducted in the spring and temperate seasons of the year to exclude the factor of environmental temperature in the research. To investigate this effect, it is suggested that a study with the same framework as the present study be conducted in the very cold or hot months of the year or in hot and cold regions.

#### **Acknowledgement**

This article has been extracted from the PhD. dissertation in the field of management in collaboration with supervisor and consultant professors at South-Tehran branch of Islamic Azad University. I warmly appreciate the Emam Khomeini airport employees and also of the honorable judges.

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