

USE OF SENSORY ANALYSIS TO APPRECIATE THE QUALITY OF APPLE JUICE

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Abstract

In a period when competition is increasing, and the quality of food is an important element that the consumer takes into account in the choices he makes, sensory analysis is a useful tool for any manufacturer. Thus sensory analysis is a method of establishing consumer preferences regarding a particular product starting from the use of the senses: taste, smell, hearing, sight, tactile feeling. In this way, it can contribute to the evaluation of the taste quality of a product, but also to its differentiation in relation to the competition, to its positioning on the market, to the identification and transposition of tastes, all of which result in increasing the quality and satisfying the taste of the consumers. The present paper aims to analyze consumers' preferences regarding the apple juice product, the methods used being the Likert scale and the rank ordering method. In this way we managed not only to measure the level of consumer satisfaction, but we could also classify the apple juice assortments, in relation to the intensity of the sensory characteristics that were the basis of the case study.

Key words: sensory analysis, quality, consumer, competition

INTRODUCTION

The importance of using sensory analysis for the appreciation of food products has emerged since the use of information resulting from microbiological and physico-chemical analyzes were no longer sufficient to make decisions regarding the production and marketing process.

Sensory analysis is based on the ability of the sensory organs to appreciate different characteristics of the products, thus using taste, smell, sight and taste. In this way one can appreciate both the taste quality of a product, but different defects of it can be identified. By using the sensory analysis it can be achieved to improve the quality of the products, both from the point of view of content, as well as from the organoleptic point of view, it can prolong the life cycle of a product, it can select, evaluate and control the raw materials used, the new trends can be identified and understood or the return on investments in the field of development research can be increased. Moreover, the

sensory analysis has lately become an important tool for the marketing activity, because it offers a better knowledge of consumer behavior, and at the same time, a means of quality assurance.

Even though we have listed only some of the advantages of using sensory analysis, we consider that these are solid arguments for the development of this sector which can add value to the activities carried out in the activity of food production and marketing [2]. Specialists believe that the correct use of sensory analysis can lead to a quick, easy and cheap control of the quality of raw materials and finished products.

The appreciation of the quality of the food products is achieved by decomposing the properties of a product into several components that are measured by awarding scores, percentages, etc., the sensory qualities being appreciated by summing these values.

Sensory value is expressed by attributive quality characteristics, which cannot always be determined by objective means, so it can be said that there is a high degree of

subjectivity in the consumer's perception of sensory quality [9].

There are a variety of methods of sensory appreciation of food products, some of them analytical, and others preferential, some aiming to describe quality, others to order products in relation to quality or to differentiate quality [1]. In the category of differential methods are the rank ordering methods, quality description methods and preferential methods. However, any of the methods would be used, it must contribute to the continuous improvement of foodstuffs both from the composition point of view and from the organoleptic point of view.

In the present paper we set out to analyze four types of apple juice obtained in a farm in the county of Dambovită, county in which the areas cultivated with apples is over 12,800 ha. The productions obtained at the level of 2016 and 2017 are presented in table 1, finding that apple production represents 75% of the total fruit production of this county in 2016 and 58% in 2017.

In the conditions in which part of this production cannot be capitalized as such due to the low quality, and on the other hand the need to diversify the activities in the farms [3] (in this case finding an increase of consumption demand for natural juices) the producers turned their attention to the creation of small fruit processing factories and their transformation into juices. In this way the income obtained from the agricultural activities can contribute to the increase of the well-being of the rural households [8].

Table 1. Evolution of fruit production in Dambovită county (tons)

Year	2016	2017
Total fruit production	34,393	76,096
Apple production	25,930	43,809

Source: INSSE [4], Own processing.

Apple juice is part of the category of fruit juices that are non-alcoholic drinks, which can be obtained from different species of fruit, by pressing or grinding [5].

Apples contain on average: 84 - 93% water, 0.3% ash, 8.30% reducing sugars, 1.60 - 4% sucrose, 0.90 - 1.70% cellulose, 0.50%

pentose, 0.40% lignin, 0.20% free acids, 0.60% combined acids, 0.4% pectin [6].

The juices can be obtained either by the extraction of the cellular juice from the fruits, the process being the pressing or diffusion, in which the crushed fruits have a weaker flavor, but have a higher content of pectins and polyphenols. From the point of view of yield, it is higher at diffusion extraction, as compared to that by pressing [7, 10].

Depending on the filtration method, you can get clear or cloudy natural juice. Natural juice-cloud is not filtered and contains pulp particles that will later deposit [12].

MATERIALS AND METHODS

Because in this paper we set out to analyze what is the satisfaction of the clients regarding the different types of apple juice, as well as their classification according to the intensity of the characteristics, we have chosen as methods of analysis and interpretation of Likert scale and the order of ranks.

The Likert scale is used to analyze the different types of questions used in the survey of the respondents regarding the characteristics of a product, being frequently encountered in marketing studies, as well as in customer satisfaction research. Customer satisfaction and measuring this satisfaction is an important element of the Quality Management System. The degree of difference can be appreciated through the scale, but it does not measure the specific difference between the measured sizes.

The method consists of assessing each characteristic of the product starting from a set of questions formulated in a questionnaire consisting of sentences with favorable or unfavorable answer to the analyzed stimulus. Generally the scale has 5 values, but it can go up to 7 or 9. Depending on each feature, a score is calculated, eventually establishing a global score.

Scale levels are assigned scores between 2 and - 2, so that positive or negative values can have similar meanings.

The calculation of the score, for each characteristic is done as follows:

Score_{characteristic} = (no. attribute views 1 x (+2) + no. attribute views 2 x (+1) + no. attribute views 3 x 0 + no. attribute views 4 x (-1) + no. attribute views 5 x (-2))/ no. respondents.

The overall score is determined as follows:

$$\text{Overall score} = \sum \frac{\text{feature score}}{\text{no. characteristics}}$$

The second method used in assessing the quality of apple juice is the ordering of ranks, according to which one can appreciate complex characteristics of the product, such as appearance, taste, color, etc.

Through the method, the respondents are asked to rank the products according to the evaluated criteria [11], resulting in a number of ranks equal to the number of analyzed products. Subsequently, these rank ranks are attached to values.

The overall score or average is an arithmetic mean of the scores or averages calculated for each product analyzed.

RESULTS AND DISCUSSIONS

The case study involved analyzing the quality of four types of apple juices, the first represented by apple juice without the addition of other fruits, the second represented by apple juice mixed with gout, the third represented by apple juice mixed with beet. red and fourth represented by apple juice and pears.

Each of the 4 kinds of apple juice was tasted by 103 untrained persons, the tasting taking place between September 25 - November 25, 2019 in fairs, as well as in the factory.

The study was carried out by applying a questionnaire.

The characteristics sought in appreciating the quality of the juices were: appearance, taste and color.

The first quality assessment method used the Likert scale.

Five levels of agreement, respectively disagreement were used, namely: total agreement, agreement, indifferent, total disagreement and disagreement.

The three characteristics of the first assortment of apple juice were analyzed by formulating the opinions that were centralized and presented in Table 2.

Table 2. Distribution of subjects' appreciation for apple juice

Product	Total agreement	Agree-ment	Indi-fferent	Disagree-ment	Total Disagreement
Color	72	17	2	12	0
Appearance	69	20	2	12	0
Taste	63	25	7	8	0

Source: Own processing.

Starting from the data presented in Table 1 regarding the respondents' ratings, scores were calculated for each of the characteristics. Thus the score for color was 1.44, for appearance 1.42, and for taste 1.39. The overall score calculated as the arithmetic mean of the three scores was 1.42.

The evaluation of the characteristics for the second product, apple juice with quince, is presented in Table 3.

Table 3. Distribution of subjects' appreciation for apple juice with quince

Product	Total agreement	Agree-ment	Indi-fferent	Disagree-ment	Total Disagreement
Color	84	7	5	7	0
Appearance	83	8	4	8	0
Taste	87	12	2	2	0

Source: Own processing.

According to the centralized data based on the answers offered by the 103 people, the three scores given for color, appearance and taste were: 1.63 (color), 1.61 (appearance) and 1.77 (taste). The overall score is 1.67.

For apple juice with red beet, the ratings are presented in Table 4.

Table 4. Distribution of subjects' appreciation for apple juice with red beet

Product	Total agreement	Agree-ment	Indi-fferent	Disagree-ment	Total Disagreement
Color	89	10	2	2	0
Appearance	88	9	4	2	0
Taste	59	27	10	9	0

Source: Own processing.

Red beet apple juice was rated with a score of 1.80 for color, 1.78 for appearance and 1.32 for taste. The overall score was 1.63.

The appraisals regarding apple and pear juice are presented in Table 5.

Table 5. Distribution of subjects' appreciation for apple juice with pears

Product	Total agreement	Agreement	Indifferent	Disagreement	Total Disagreement
Color	65	24	10	4	0
Appearance	64	27	8	4	0
Taste	82	15	5	1	0

Source: Own processing.

The calculation of the scores revealed a score of 1.45 for color, 1.47 for appearance and 1.73 for taste. The average of the three scores was 1.55.

The analysis of the three products in terms of overall score pointed out that the most appreciated was apple juice with pears, followed by apple juice with guts, apple juice with red beet, and finally the juice of apples.

And in terms of taste, the same hierarchy is maintained. However, if we analyse the consumers' preferences regarding color and appearance, the red beet juice is in the first place in the consumers preferences followed by the apple juice with the guts, the apple juice with pears, and the last place is the juice apples without additions.

Therefore, consumers are in agreement with the analyzed products, the overall picture being a positive one.

The second method used to assess consumer preference over the four types of apple juice was the rank ordering method.

Although in the case study there were only four categories of products under analysis, I preferred this method because it allows subjects both the comparison between products, but also their ordering.

The presentation of the samples was done concomitantly, the products being ordered according to rank taking into account the color the appearance and the taste.

The data used to calculate the averages regarding the characteristics are presented in Tables 6, 7, 8 and 9.

Table 6. Distribution of subjects' appreciation for apple juice

Product	Rang 1	Rang 2	Rang 3
Color	72	17	14
Appearance	69	20	12
Taste	63	25	8

Source: Own processing.

The averages calculated for the three characteristics were as follows: M color = 2.56, M appearance = 2.51 and M taste = 2.40.

Table 7. Distribution of subjects' appreciation for apple juice with quince

Product	Rang 1	Rang 2	Rang 3
Color	84	7	12
Appearance	83	8	12
Taste	87	12	4

Source: Own processing.

For apple juice with peel, the calculated averages were as follows: M color = 2.70, M appearance = 2.69 and M taste = 2.81.

Table 8. Distribution of subjects' appreciation for apple juice with red beet

Product	Rang 1	Rang 2	Rang 3
Color	89	10	4
Appearance	88	9	6
Taste	59	27	19

Source: Own processing.

For the third assortment of apple juice, the one with red beet, the calculated averages were: M color = 2.86, M appearance = 2.80 and M taste = 2.43

Table 9. Distribution of subjects' appreciation for apple juice with pears

Product	Rang 1	Rang 2	Rang 3
Color	65	24	14
Appearance	64	27	12
Taste	82	15	6

Source: Own processing.

The averages obtained for apple juice with pears were: M color = 2.50, M appearance = 2.46 and M taste = 2.74.

The test confirms the results that were obtained and measured using the Likert scale.

CONCLUSIONS

Although the Likert scale may have the disadvantage of the distortions due to the retention of the respondents regarding the value of the answers given, it still remains the most important scale of measuring the attitude of the customers regarding the product categories subject to their assessment.

The global score highlights that the apple juice brought to the market corresponds in terms of sensory characteristics.

Following the centralization of the results obtained by the rank ordering method, the following aspects have resulted:

- The best color score was obtained from apple juice with red beet, followed by apple juice with guts, apple juice without any other fruit, and on the fourth place was apple juice with pears.
- As regards the appreciation of the appearance, the same order of consumer preferences is maintained
- From the appreciation of the taste it turned out that the most appreciated assortment was the apple juice with guts, followed by the apple juice with pears, on the third place was the apple juice with red beetroot and the last place was the simple apple juice
- The products meet organoleptic requirements of consumers
- The present study was useful to the producers because according to the preferences of the consumers, the quantities that will be produced from each of the 4 assortments were established

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