
THE IMPACT OF FOOD VISUAL AESTHETICS ON CONSUMER PERCEPTION OF A HEALTHY AND TASTY MEAL IN THE HOSPITALITY AND TOURISM INDUSTRY

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ARTICLE INFO

Original Article

Received: 29 October 2022

Accepted: 10 February 2023

doi:10.59267/ekoPolj2303689J

UDC 608.34:641.56]:[338.48-6:641/642

Keywords:

consumer perception, visual aesthetics, healthy meal, tasty meal, sensory marketing, hospitality

JEL: M31, M310, L66, Z32

ABSTRACT

The visual appearance of food is an important attribute when people choose food. This paper aims to examine the impact of visual aesthetics on the consumer's perception of a healthy and tasty meal. The paper consists of two empirical researches, which includes survey and experimental research. The survey results indicate the connection between the visual appearance of meals and the consumer's perception of health and tasty meals. The experimental research compare consumer expectations about the meal taste based on its visual appearance, and actual consumer experience after tasting that meal. The results show that there are differences in consumer expectations, based on visual aesthetics and they should assist the hospitality and tourism business from acknowledging how the visual aesthetics of food can influence consumers' food choice decisions. This can be an effective technique for hospitality and tourism companies in attracting consumers and increasing their loyalty.

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Introduction

Food perception is connected with all five human senses experience. The development of sensory marketing indicates the beginning of a new era in the field of marketing, in which consumer's all five senses will be in the center of marketing strategies and techniques. In this paper, the focus will be on the sense of sight, as well as how this sense could be used to influence consumer decisions, especially in the field of gastronomy. Considering the fact that gastronomic experiences are increasingly becoming the main drivers of tourism development, the authors will try to analyze the impact of food visual aesthetics on consumer perception of a healthy and tasty meal in the hospitality industry.

In recent decades, we have witnessed the growing interest of people in a healthy lifestyle, which includes a healthy diet. Nutritionists recommend daily intake of a variety of food for a healthy life, and traditional Japanese cuisine recommends that each meal should contain five colors (red, yellow, green, black and white). People must rely on their perceptions of food when deciding what to eat, and if they choose a variety of colorful foods, they can meet the guidelines for a healthy diet.

This paper aims to examine the impact of visual aesthetics on the consumer's perception of a healthy and tasty meal. The subject of this paper is to determine the connection between the visual aesthetics and the consumer's perception of a healthy and tasty meal. The main research issue is to provide an assessment of whether the appearance and content of food, in a way inspired by aesthetics, have an impact on consumer expectations, and therefore on their perception of food as healthy and tasty. The paper consist of two different researches (survey and experimental research), which indicate the ways and effects of stimulating the sense of sight in the context of perceptions and choices of healthy food by consumers. First, the research includes the analysis of the aesthetic experience of food and differences in the interaction of colors and flavors of meals depending on the sociodemographic profile of consumers. In addition, an assessment of the influence of food design on the expectations that people have from the visual experience of food and their subsequent experience after tasting and consumption is given.

The main purpose of this paper is to broaden knowledge of gastronomy experiences in hospitality and tourism, which should be used in everyday business improvement. Results of the research indicate that stimulating the sense of sight can be an effective technique for hospitality companies in attracting consumers and increasing their loyalty. In that way, this paper should provide support for the significance of sensory marketing to enhance the satisfaction of customers in hospitality. This paper with an original thematic contributes to general knowledge by advancing previous research about similar topic, and especially contributes to the literature on food decision making, hospitality and tourism development and sensory marketing.

Literature review

In order to better understand the influence of sensory perception in hospitality and tourism, it is necessary to determine how consumers get an impression of a product

when they see it, hear it, touch it, feel its taste and smell. It is questionable if the color of the product's packaging, a pleasant feeling when touching it or perhaps adequate music that contributes to the general atmosphere stimulates the consumer to choose a product. "Through the human senses, sensory information is transmitted to the human mind and transformed into perceptions, feelings and sensory experiences" (Hulten, 2020, 19). Some authors emphasize the fact that, as people gain impressions of everything in their environment using their senses and this unconsciously influences their decisions, the importance of sensory marketing is exceptional (Krishna, Schwarz, 2014). It can be said that "sensory marketing offers consumers a sensory experience that adds value to their consumption" (Roggeveen et al., 2020, 7). In his book, Krishna (2011) explained that there is a need to understand the fact that "services and products have sensual nature, and the customer should experience all the senses - sight, taste, touch, sound and smell". When it comes to aesthetics, the question arises as to what is beautiful and how to define the sense of beauty in general. For centuries, people have dealt with this topic, but it can be said that aesthetics includes what makes an object beautiful and what people feel when they encounter that object (Horng, Hsu, 2020).

In accordance with the new marketing paradigm, the service industry and gastronomy are gradually applying the concept of holistic communication, which includes all five human senses (Lin, 2019). Research shows that hospitality and gastronomy businesses can influence consumer decisions and their overall experience by "providing the best designs for their products, such as comfortable furniture, unique designs and colors, music that evokes positive emotions and pleasant smells" (Shah, 2018). The creation of impressions has always been an important part of hospitality (Buharova, Vereshchagina, 2021). In recent times, the usage of the term gastronomy tourism for the appellation of food-related types of tourism has increased (Dixit, Prayag, 2022), as well as culinary tourism and food tourism (Ellis et al., 2018; Everett, 2019), which is an expanding field (Anderson et al., 2017). Henderson (Henderson, 2004) pointed out those experts in tourism use food as a promotional tool, so it is evident that food affects the overall customer's experience. Some authors explained that food represents one of the factors of the general tourism development (Stamenković, Đeri, 2016), so the hospitality and gastronomy are "a prerequisite for tourism development" (Ilić et al., 2016). Considering the fact that tourism sector is one of the most powerful drivers of economic growth (Rahmiati et al., 2019), it is obvious why the improvement of hospitality and tourist offer is important.

The authors Schifferstein et al. (2020) connect the visual aesthetics of food with concepts such as "sense pleasure" or "sensory enjoyment". Delwiche (2012) claims in his research that "people eat with their eyes first". People evaluate food precisely on the basis of its visual aesthetics, and accordingly perceive that more visually appealing food is tastier. Research related to food aesthetics has shown that several important factors are involved in the visual presentation of food, which affects the consumer's evaluation of food and decision-making. Many of these factors came from "new culinary trends and guidelines, established by gastronomes around the world" (Rowley & Spence,

2018, 1). The importance of such research is related to the role that gastronomy and hospitality plays in the tourism industry, which has been increasingly highlighted in recent years in Serbia (Ćirić et al., 2022).

Visual properties of food, including color, are indeed important elements for food choice (Renner et al., 2016; Schulte - Mecklenbeck et al., 2013). It is necessary to take into account various factors that influence consumers' decisions about food choices and their perceptions of colors, such as consumer demographic factors (age, gender, culture, education), as well as their lifestyle (Sliburite, Skerite, 2014).

Color and gastronomy are closely related to each other, and the main reason is that the color of food represents "the most prominent visual sign, which determines the sensory properties of food such as taste" (Spence, 2015). In this way, "color affects consumers' expectations about the food they search for, buy, and consume" (Spence, 2016). When deciding what and how much to eat, people generally have to rely on their perception of food. An increasing number of authors point out that the taste experience is mostly determined by the expectations formed on the food color base, which means that the color of the food is decisive when choosing (Spence, Piqueras - Fiszman, 2016). Humans make decisions about food choices every day, and their food color preferences have been formed during evolution and depend on experience and inherited traits (Lieberman, 2006).

In addition to food color forming consumers' taste expectations, color intensity can be a sign of food quality (Valentin et al., 2016) as well as the nutritional value of food (Foroni et al., 2016). In his research, Spence (2015) points to the fact that "meeting or not meeting color expectations determines whether the consumer will like the food." Pereira (2021) points out that the color of the observed product affects the consumer's perception of the nutritional value of that product. When it comes to food coloring, "common natural colors are green, yellow, orange, red, pink and purple" (Hutchings, 1999). The blue color is rarely used in food products and it is often associated with the notions of "unnatural and artificial" (Spence, 2018).

It has been noticed that in recent decades, an increasing emphasis has been placed on the choice of healthy food, so an increasing number of people strive for a healthy diet. However, the average socio-economic and educational status of the population, the level of health awareness and the quality of food differ from country to country (Julia et. al, 2022). According to data available on the Statista website, consumers in the US have made certain changes in their diet (more fruits and vegetables) and lifestyle to improve their health. "In 2022, the global health food market was estimated at \$841 billion and it is projected to grow up to \$1 trillion by 2026" (Statista, 2022).

In a survey of Canadian consumers in which they were asked what they believe a healthy meal consists of, more than half said that more fruits and vegetables make a meal healthier (Statista, 2022). According to the "Food and Health study 2022", conducted by the International Food Information Council (IFIC, 2022), surveyed US consumers showed significant differences in the perception of healthy foods. On that

occasion, 37% of the respondents chose the attribute “fresh”, which they associate with healthy food, then 32% chose the attribute “contains little sugar”, 29% of the respondents chose the attribute “good source of protein”, 28% the attribute “contains fruit or vegetables”, 27% “a good source of nutrients” and 26% of respondents associate healthy food with the attribute “natural”. In her research, Hagen (2020, 15) conducted a series of experiments and came to the conclusion that “people perceive the same food as more natural if it looks more beautiful, which implies that it is healthier, in terms of the content of positive elements (e.g. nutrients) and the absence of negative elements (e.g. calories)”. Haws et al. (2017) found in their study that consumers believe that what is healthy is expensive, although this is unlikely to be true for all products.

Visual aesthetic research has shown that the food color affects consumer perceptions when it comes to a healthy meal. Thus, in his paper, Schuld comes to the conclusion that the color of the food label has an impact on the consumer’s perception of healthy food, where respondents chose a product with a green label as healthier, in contrast to the same product with a red label (Schuldt, 2013). . When it comes to the perception of a healthy meal based on color, green is usually the color that symbolizes something natural and healthy (Michels et al., 2022). The green color has only positive implications and it is associated with organic food, health and nature (Schuldt, 2013). The red color has some positive associations (romance and passion), but it is predominantly associated with negative ones, such as danger and warning (Elliot et al., 2009).

Some researches show that the visual appearance of the food served on the plate has an influence on the formation of the consumer’s opinion about that dish (Michel et al., 2015). Authors Piqueras - Fiszman et al. (2012) came to the result in their research that e.g. when strawberry mousse is served in white dessert plates (compared to serving in black dessert plates), consumers perceive it with a significantly more intense taste, because there is a greater contrast in regard to the plate. Then, Elliot & Maier (2014) conclude that red kitchenware has certain effects in the perception of the food and drinks taste. Roque et al. (2018) showed that differently placed food, in certain colors, can influence the consumer’s perception, where centrally placed dishes on a plate, with colorful colors, are perceived as more creative and beautiful compared to monochromatic food that is not placed centrally. Perceptions of different food colors also depend on the context itself. Spence et al. (2010) state that as the fruit ripens and becomes sweeter, its color changes from green to red, and that’s why some psychologists claim that people associate the red color with sweetness, and green with acidity.

Conceptual framework and the development of hypotheses

The research presented in the theoretical part of the work is the motive for an attempt to expand the framework related to the topic of food visual aesthetics. This research aims to examine the impact of visual aesthetics on the consumer’s perception of a healthy and tasty meal. The specific objectives of the research are reflected in: 1) providing an assessment of whether the appearance and content of food, in a way inspired by aesthetics, have an impact on consumer expectations, and therefore on their perception

of food as healthy and tasty; 2) understanding how visual elements of food can influence consumer behavior. Based on an insight into the available literature related to the importance of the visual aspect and color contrast of the served food on consumer attitudes about a tasty and healthy meal, the initial hypotheses were set:

H1: The visual appeal of food is positively correlated with the taste of food.

H2: Differences in the age and level of education of consumers result in certain differences in terms of preferences in choosing healthy meals based on color as an element of the visual experience of food.

H3: Food that is aesthetically nicely arranged and contains intense colors is positively correlated with consumers' expectations regarding tasty and healthy food, as well as their intention to purchase (order) that dish.

Methodology

Starting from established hypotheses, in this paper it was used a combination of different methods, whereby the choice of methods was determined by the topic of the paper and research goals. The applied methodology is qualitative and quantitative, and exploratory and explanatory research was conducted. Considering the complex nature of sensory marketing, which includes sensory experiences, the combination of the mentioned types of research should lead to adequate and acceptable results.

In the first phase of research, which is exploratory, authors use methods of analysis and synthesis, as well as inductive and deductive methods. The method of data collection is firstly used, which is based on secondary sources from domestic and international journals and reports, and after that their analysis is performed. The combination of collected and analyzed data, together with theoretical implications, represents the starting point for further research development.

In the second phase, the phase of explanatory research, authors conducted experimental and survey research, where primary data was collected. In this phase, the observation method, comparison method, empirical method, analytical-interpretive method, statistical method, field research (systematic observation, examination: survey and experiment), inductive and deductive method were used. The purpose of this research is to provide empirical evidence that supports the importance of sensory marketing in improving consumer satisfaction in gastronomy, with a special emphasis on the sense of sight role. By defining the theoretical and empirical implications of an adequate approach to the sense of sight in sensory marketing, this research could help hospitality companies to adapt to consumer expectations and their healthy lifestyles.

Materials and methods

As part of the empirical research, survey and experimental research were conducted in order to examine the hypotheses set at the beginning.

Survey research procedure

It must be emphasized that the survey research was conducted in four phases. In the first phase, a study of the literature related to the definition of the concept of sensory marketing was carried out, especially from the aspect of the sense of sight and the perception of visually attractive food of different colors, which is considered and experienced as healthy and tasty. In this phase, the research instrument was formulated and an online questionnaire was created through Google Forms. The research was carefully prepared, with clear and precise instructions to the respondents and a questionnaire that was not standardized and which was created for the needs of this research. Using a detailed analysis of theoretical sources of data on the given topic, by consulting both domestic and foreign authors, key areas, factors and characteristics were determined, on the basis of which a questionnaire was formed with questions whose answers lead to the possibility of processing the desired data and obtaining the necessary results. In the second phase, the research was conducted by distributing the link for filling out the questionnaire through social networks (Facebook), as well as through Viber and Whatsapp groups. In the third phase, statistical processing (using the statistical software IBM SPSS 20.0 (Statistical Package for the Social Sciences)) and analysis of the results obtained from the research was performed, while in the fourth phase, positions were presented through discussion and drawing conclusions.

Survey research sample

The estimation of the sample size is based on the following criteria: a margin of error of 5%, a confidence level of 92% and a sample frame of $N=125.876$, which represents the total number of population in the city of Leskovac (according to the last census population). The sample size was checked using the Raosoft Calculator which showed that the recommended sample size at the 92% confidence level was 310 respondents. According to this, the sample size in this research was 310 respondents from the territory of Leskovac, who filled out an online questionnaire in the period from April to June 2022, and participation in this research was anonymous.

Measurement scales and data analysis in survey research

The questionnaire consists of three parts, where the first part is based on a nominal and ordinal scale, the second - on a five-point Likert scale, and the third - on an ordinal scale. The first part of the questionnaire represents the general part and refers to socio-demographic data. It contains eight questions that gain insight into the gender, age, education, amount of monthly income, as well as the status of the respondent. Then there are questions related to a special diet and the possible existence of a color recognition disorder, as well as the question of the frequency of going to a restaurant (ordering food). The second part of the questionnaire represents its main part and contains a list of attributes that can be used to evaluate the respondents' perceptions and attitudes about the impact of visual aesthetics and food color on the consumer's perception of a healthy and tasty meal. In this part, the respondents choose one answer on a scale from 1 to 5, with options ranging from 1 ("I totally disagree") to 5 ("I totally agree"). The third part of the questionnaire contains

a presentation of different types of meals (five types of salads and four types of pureed sauces), where each respondent chooses one answer (one salad and one pureed sauce), which best reflects his perception of whether it is a healthy and a delicious meal. A scale of 1 to 3 is given here, with options 1 (“Not a healthy meal”), 2 (“I have no opinion”) and 3 (“Healthy meal”). In addition, in this part of the questionnaire, respondents choose one of five salads and one of four mashed sauces, which they consider the healthiest. The meals were prepared exclusively for the purposes of this research, after which each of them was photographed separately (from the same angle, with the same camera), on a white background and served on a white plate.

Survey research methods

Different methods were used during the statistical processing of the collected data. Descriptive statistics methods used percentage, frequency distribution, measures of central tendency (arithmetic mean) and measures of dispersion (standard deviation). Cross-tabulation analysis was performed in order to find the relationship between age and level of education according to the specific attribute. The exploratory factor analysis (EFA) was performed using the principal component method and Varimax rotation in order to associate each attribute to at most one factor. After that, a multiple regression analysis was conducted, in order to measure influence of visual aesthetics and food color on consumer’s perception of healthy and tasty meal.

Considering the fact that an essential feature of any questionnaire is its reliability, the measuring instrument for checking the internal consistency of the scale used in this research is Cronbach’s alpha (α) coefficient, which can have a value between 0 and 1. Tavakol and Dennick (2011) provided guidelines for interpretation values of the Cronbach alpha (α) coefficient, where values in the interval between 0.7 and 0.8 are marked as adequate. In this survey research, the Cronbach alpha coefficient is 0.715 (it refers to all attributes), which indicates acceptable reliability of the measuring instrument and leads to the conclusion that the variables in this research have good internal consistency.

Experimental research

Based on the literature review, it can be expected that the consumer perceives a meal as healthy and tasty not only based on the ingredients it contains, but also based on the visual appearance of that meal. For this reason, an experimental study was conducted, which was designed to compare consumer expectations regarding the taste of a meal based on the visual appearance of the meal, and the actual experience of the consumer after tasting that meal. In this research, which was conducted in April 2022, 20 respondents participated, who filled out questionnaires and performed tastings under identical conditions. Each participant, after taking his position at the set table, received a specially prepared meal, his cutlery, a napkin and a questionnaire. Before starting the meal tasting, each participant was asked to first fill out a first questionnaire about the visual appearance of the meal. The first questionnaire contained six questions on the basis of which the respondents’ expectations of whether a meal is healthy and tasty

based on its visual appearance could be assessed. After tasting the meal, the subjects completed a second questionnaire, which tests the subjects' actual experience after tasting it and their experience through seven different questions. The meal contains food of different and intense colors (green, red, orange...), especially aesthetically arranged and positioned on a white plate.

Results

Survey research results

Descriptive statistical analysis

An overview of the socio-demographic characteristics of the respondents is given in the Table 1, with detailed data on their total number and percentage. According the total number of respondents (n=310), 73.9% are women and 26.1% are men. Due to this difference in gender structure, it was not observed if gender affects food preferences based on visual appearance, because the data would not be appropriate.

Table 1. Socio-demographic characteristics of the respondents

Variable	Frequency	Valid %
Gender		
Male	81	26,1
Female	229	73,9
Age		
18-24	88	28,4
25-34	61	19,7
35-44	80	25,8
45-54	60	19,4
55-64	19	6,1
65 and more	2	0,6
Employment status		
Employed	207	66,8
Unemployed, but looking for work	46	14,8
Unemployed, but not looking for work (student, housewife, pensioner)	57	18,4
Education level		
Primary school	1	0,3
Gymnasium/High School	95	30,6
Higher education	149	48,1
Master's degree	54	17,4
PhD	11	3,5
Monthly income		
up to 300 EUR	72	23,2
300-470 EUR	78	25,2
470-640 EUR	89	28,7
640-810 EUR	34	11,0
over 810 EUR	37	11,9

Variable	Frequency	Valid %
Do you have color blindness (color recognition disorder)?		
yes	3	1,0
no	305	99,0

Source: Author's calculations, based on data analysis in SPSS 20.0.

According to the age structure, the largest percentage of respondents are those between 18 and 24 years old (28.4%) and between 35 and 44 years old (25.8%) and then follow respondents between 25 and 34 years (19.7%), respondents between 45 and 54 years (19.4%) and those between 54 and 65 years old (6.1%). The largest number of respondents are employed (66.8%), have completed higher education (48.1%) and have a monthly income from 470 to 640 EUR (28.7%). Mostly of respondents (25.2%) go to a restaurant or order food once a month, 93.5% do not have any special diet and only 1% of respondents have color recognition disorder.

Using descriptive statistical analysis, the arithmetic mean and standard deviation for ten attributes were calculated, as shown in Table 2. The goal of this analysis is to determine the homogeneity of the respondents' attitudes. The highest value of the arithmetic mean is for the attitude: "I enjoy observing the beautiful things", which means that the largest number of respondents agree with this attribute. Respondents have the lowest degree of disagreement with this statement, given that it has the smallest standard deviation. The least accepted statement is "An aesthetically arranged meal is a tasty and healthy meal", where the value of the arithmetic mean is the lowest, and at the same time the value of the standard deviation is the highest, which indicates the greatest degree of disagreement among respondents with this attribute.

Table 2. Descriptive statistics results

	Attribute	Arithmetic Mean	Standard Deviation
1	I enjoy observing the beautiful things.	4,76	,516
2	I pay attention to the colors and design of the served dish.	4,38	,790
3	The appearance of the served food is very important to me.	4,09	,958
4	Colorfulness and high color contrast are associated with the freshness of the meal.	3,78	1,153
5	Colorful and food with intense colors is a healthy meal.	3,35	1,223
6	If I choose a healthy meal, I will choose colorful food.	3,23	1,200
7	If I choose a meal, I will decide for a healthier dish.	3,56	1,155
8	I am willing to pay more for a healthier meal.	3,82	1,159
9	A visually appealing meal whets my appetite and encourages a willingness to taste and consume the dish.	4,16	1,004
10	An aesthetically arranged meal is a tasty and healthy meal.	2,95	1,257

Source: Author's calculations, based on data analysis in SPSS 20.0.

The third part of the questionnaire contains photos of mixed salads of different colors, which were prepared to search the relationship between colors, color combinations, the visual appeal of the salad and the respondent's perception of whether it is a healthy meal. Salad 1 contains green color, salad 2 - red color, salad 3 - green, red and light brown colors, salad 4 - orange, green and red colors and salad 5 - red and green colors. The results of descriptive statistics shows that the highest value of the arithmetic mean and the smallest standard deviation is for salad 5, around which there is the greatest agreement among respondents. The lowest value of the arithmetic mean and at the same time the highest value of the standard deviation exists with salad 3, so this salad is the least accepted, with the greatest disagreements among respondents. Looking at the frequencies and percentages of responses, for each salad, the largest percentage of respondents perceive it as a healthy meal. Authors also calculated the frequencies and percentages of selected salad, which the respondents perceive as the healthiest. The largest number of respondents chose salad 4 as the healthiest (28.7%) and salad 5 (27.1%). Given that each of the observed salads contains components of intense colors, it can be said that the result indicates that the respondents perceive a meal with intense colors as a healthy meal.

In addition to salads, in this part of the questionnaire, various pureed sauces were presented (puree sauce 1 - orange color, puree sauce 2 – red color, puree sauce 3 – yellow color, puree sauce 4 – green color). In this case, a descriptive statistical analysis was applied again, and the results shows that the highest value of the arithmetic mean and the lowest standard deviation is for the sauce 4, where is the highest agreement among the respondents. The lowest value of the arithmetic mean and, at the same time, the highest value of the standard deviation exists for pureed sauce 2, which leads to the conclusion that this pureed sauce is the least accepted. By looking at the frequencies and percentages of responses, pureed sauce 1 and pureed sauce 4 are perceived by the largest number of respondents as a healthy meal, while with pureed sauce 2 and pureed sauce 3, the largest number of respondents do not have an opinion, which leads to the conclusion that food that is orange and green color is perceived by respondents as healthy. Authors calculated the frequencies and percentages of selected pureed sauce, which respondents perceive as the healthiest. The largest number of respondents chose pureed sauce 4 (51.3%), which is green color, and the smallest number chose pureed sauce 2 (9.4%), which is red color. If we analyze these results, we come to the conclusion that respondents perceive a meal that is green color as extremely healthy, in contrast to a meal with red color. These results partially confirm the third hypothesis.

Cross-tabulation analysis

Using the cross-tabulation method, the relationship between age and level of education was examined according to the attribute "If I choose a healthy meal, I will choose colorful food". The obtained results indicate that the largest percentage of respondents aged between 18 and 24 years (40.9%) and between 55 and 64 years (57.9%) do not have an opinion, while in other age groups the largest percentage expresses agreement with the attribute (Table 3). The assumption is that the population of young consumers

(between 18 and 24 years old) has limited financial resources, which they also need for other pleasures, so the visual appearance of the meal is not of great importance to them, but only that it tastes good.

Consumers between the ages of 25 and 55 are mostly employed, engaged in work and have a formed awareness of the importance of healthy nutrition, so they pay more attention to intensive colored dishes, which they perceive as healthy. However, members of the oldest category of respondents do not decide about the attribute, and the reason for this may be their potential lack of interest in the visual appearance of food. If we observe the level of education, there are evident differences in the responses of respondents with a high school (46.3%), as well as respondents with higher education (38.9%), where the highest percentage agrees with the attribute, unlike respondents with master's degree (42.6%) and doctorate (45.5%), who do not have an opinion.

Table 3. Cross-tabulation of sociodemographic characteristics by attribute

	If I choose a healthy meal, I will choose colorful food				
	I do not agree at all	I do not agree	I have no opinion	I agree	I completely agree
Age					
18-24	13,6%	14,8%	40,9%	19,3%	11,4%
25-34	6,6%	8,2%	29,5%	31,1%	24,6%
35-44	12,5%	13,8%	31,2%	25,0%	17,5%
45-54	10,0%	15,8%	36,7%	13,3%	25,0%
55-64	5,3%	15,8%	57,9%	15,8%	5,3%
65 and more	0,0%	0,0%	50,0%	50,0%	0,0%
Education level*					
PS	0,0%	0,0%	100,0%	0,0%	0,0%
G/HS	7,4%	7,4%	35,9%	22,1%	24,2%
HE	14,1%	15,4%	31,5%	22,1%	16,8%
MD	7,4%	14,8%	42,6%	24,1%	11,1%
PhD	9,1%	27,3%	45,5%	9,1%	9,1%

*Note: PS - Primary school; G/HS - Gymnasium/High School; HE - Higher education; MD - Master's degree

Source: Author's calculations, based on data analysis in SPSS 20.0.

The possible reason for the existence of these differences can be explained by the view that people with a higher level of education are more careful in giving answers, in the sense that they do not give an opinion without prior checking. In addition, it must be taken into account that there are probably other factors that influence the perception of a meal as healthy, which are not only related to intense and colorful colors, so that consumers cannot define their attitude only based on color as an element of visual healthy meal experience. By interpreting the results obtained through this analysis, the second hypothesis was proven.

Exploratory factor analysis

In order to perform exploratory factor analysis, it is necessary to determine the justification of its application, that is, the appropriateness of the data. An examination of the correlation matrix revealed many coefficients of values 0.3 and above. The Kaiser-Meyer-Olkin measure (KMO) was used to test the appropriateness of the data for all variables together. This indicator ranges from 0 to 1, with values less than 0.5 indicating the inappropriateness of the correlation matrix for factor analysis, i.e. a value of 0.6 is recommended as the minimum amount acceptable for good factor analysis (Tabachnick & Fidell, 2007). The value of this indicator is 0.740, as can be seen in Table 4. Bartlett's sphericity test showed us a statistically significant value ($p=0.000$), which means that there is a statistically significant correlation between the variables. In this way, the justification of the application of exploratory factor analysis was confirmed.

Table 4. KMO and Bartlett's test

The value of the Kaiser-Meyer-Olkin indicator		,740
Bartlett's test value		880,777
	Df	45
	Sig.	,000

Source: Author's calculations, based on data analysis in SPSS 20.0.

As a factor extraction method, the Principal component method (PCA) was used, in order to reduce the number of attributes into a smaller one. PCA is an approach that can be used to extract the number of underlying factors (Pallant, 2013).

As a criterion for choosing the number of factors, the Kaiser criterion was used, which retains only those factors whose characteristic value is greater than 1. In this case, PCA publicized the existence of three factors, because only the first three components have the characteristic value greater than one (Table 5). The total variance of 62.50% is achieved from these three factors, which is above the recommended value of 60% (Janković-Milić & Jovanović, 2019). The first characteristic value is equal to 3.380 and explained 33.80% of the variance in the original data. The second characteristic value is equal to 1.489 and explains 14.88% of the variance, and the third characteristic value is equal to 1.381 and explains 13.80% of the variance.

Table 5. Characteristic values, total explained variance in % and cumulative in %

Components	Initial characteristic value			Extraction sums of squared loadings			Rotation sums of square loads		
	Total	Variance in %	Cumulative in %	Total	Variance in %	Cumulative in %	Total	Variance in %	Cumulative in %
1	3,380	33,805	33,805	3,380	33,805	33,805	2,482	24,818	24,818
2	1,489	14,887	48,692	1,489	14,887	48,692	2,078	20,782	45,600
3	1,381	13,809	62,501	1,381	13,809	62,501	1,690	16,901	62,501

Components	Initial characteristic value			Extraction sums of squared loadings			Rotation sums of square loads		
	Total	Variance in %	Cumulative in %	Total	Variance in %	Cumulative in %	Total	Variance in %	Cumulative in %
4	,819	8,192	70,693						
5	,733	7,332	78,025						
6	,626	6,264	84,289						
7	,544	5,437	89,726						
8	,406	4,060	93,786						
9	,324	3,242	97,028						
10	,297	2,972	100,000						

Source: Author's calculations, based on data analysis in SPSS 20.0.

It is hard to name the components after extraction based on their factor loadings, so the factors were rotated in order to interpret them. To support in the understanding of these three factors, orthogonal Varimax rotation was conducted, which is the most common rotation method.

Table 6. Factor rotation using the Varimax method

		Components		
		1	2	3
4	Colorfulness and high color contrast are associated with the freshness of the meal.	,613		
5	Colorful and food with intense colors is a healthy meal.	,886		
6	If I choose a healthy meal, I will choose colorful food.	,825		
10	An aesthetically arranged meal is a tasty and healthy meal.	,686		
1	I enjoy observing the beautiful things.		,657	
2	I pay attention to the colors and design of the served dish.		,748	
3	The appearance of the served food is very important to me.		,798	
7	If I choose a meal, I will decide for a healthier dish.			,884
8	I am willing to pay more for a healthier meal.			,871
9	A visually appealing meal whets my appetite and encourages a willingness to taste and consume the dish.			

Source: Author's calculations, based on data analysis in SPSS 20.0.

By using the Varimax method, only those factor weights that are greater than 0.5 would be taken into account in the further analysis (Table 6). The main goal of Varimax rotation is to associate each variable to at most one factor. In order to make the interpretation of the meaning of every factor the variables that have the greatest loadings on a factor are analysed in terms of their similarity regarding the measured construct. After the mentioned rotation, a matrix was obtained on the basis of which it is possible to determine the factor weight value for each factor. Four attributes (4, 5, 6 and 10) are

attached to the first factor. Attributes from 1 to 3 are associated with the second factor, and statements 7 and 8 with the third factor. Attribute 9 is not associated with any of the three listed factors, as its factor weight is below the required level of 0.5.

Therefore, it was determined by exploratory factor analysis, using the PCA extraction method, that three factors can be distinguished from the 10 given attributes: Factor 1 - variety of colors; Factor 2 - visual aesthetics and Factor 3 - healthy meal.

Results of multiple regression analysis

In order to determine the influence of the observed three factors on consumer's perception of a healthy and tasty meal, a multiple regression analysis was conducted. As a dependent variable related to consumer perception, attribute 5 was chosen - "If I choose a healthy meal, I will choose colorful food." On the other hand, three factors were set as independent variables: variety of colors, visual aesthetics and healthy meal.

Regression model indicators are shown in the Table 7. Observed model is representative (Sig = 0.000), the coefficient of determination (R^2) is 0.623, which means that 62.3% of the variability of the dependent variable is explained by the three independents variables (factors). This means that consumer's perception is influenced by all three mentioned independent variables: variety of colors, visual aesthetics and healthy meal.

Results of the Analysis of Variance (ANOVA) shows that the independent variables statistically significantly predict the dependent variable, considering that $F(3, 306) = 168.386$, $p < 0.0005$. This indicate that the coefficient of determination differs from zero and that the regression of the influence of all three independent variables on consumer perception is statistically significant. The regression analysis results indicate that the factor that refers to the variety of colors individually the most contributes to consumer's perception of a healthy and tasty meal ($\beta = 0.762$, $p = 0.000$). Also, visual aesthetics ($\beta = 0.086$, $p = 0.015$) and healthy meal ($\beta = 0.146$, $p = 0.000$) have a positive and statistically significant impact to consumer's perception. In this way, the third hypothesis was confirmed.

Table 7. Multiple regression analysis results

Variable	β	T	Sig.
Variety of colors	0.762	21.658	0.000
Visual aesthetics	0.086	2.453	0.015
Healthy meal	0.146	4.138	0.000

Source: Author's calculations, based on data analysis in SPSS 20.0.

Together with the results of the factor and multiple regression analysis, the results obtained by analyzing the respondents' answers regarding the given meals (various salads and puree sauces) and their selection in accordance with the perception of these meals as healthy, confirm the third hypothesis.

Experimental research results

Descriptive statistical analysis

After data collection in experimental research, analysis was performed, whereby the statistical software IBM SPSS 20.0 was used to process the views of respondents. Using descriptive statistical analysis, the arithmetic mean and standard deviation were calculated for all six attributes in the first questionnaire (which the respondents filled out before tasting the meal), as well as the response frequencies with percentages. The highest values of the arithmetic mean are for the questions “How artistically arranged is this dish?” and “How delicious does this dish look like?” with the lowest values of the standard deviation. The least accepted statement is “The preparation of this dish is simple”, where the value of the arithmetic mean is by far the lowest, and at the same time the highest value of the standard deviation, which points to the highest degree of disagreement among the respondents with this attribute. After tasting this specially prepared meal, the plate with any leftover of food was removed and the respondents were given another questionnaire.

The data collected using the second questionnaire was processed using the same statistical software, and the results of the descriptive statistics were considered. Analyzing this data, it was determined that the largest percentage of respondents liked the taste of the meal extremely much, while the data from the first questionnaire must be taken into account, where 90% of them declared that they felt hungry after just seeing the meal. In addition to this, an attempt was made to determine which colors were remembered by the respondents, and if the meal contained those colors. The answers were relatively consistent, with most respondents claiming that the meal contained orange, red, green and white colors, while there was no blue color. If we compare these answers with the actual appearance of the meal, they completely match. By comparing the results of the first and second questionnaires, we can come to the conclusion that a large number of respondents (95%) liked the presentation and arrangement of the meal (first questionnaire), and after tasting the dish, 95% of the respondents declared that the dish was delicious. These experimental research results confirm the first hypothesis.

Discussions

In the present paper the relationship between food visual aesthetics with consumer perception of a healthy and tasty meal was investigated. By applying various statistical methods, which were used in empirical researches in this paper, all initial hypotheses have been confirmed (Table 8).

Table 8. Summary results

Hypotheses	Empirical research	Analysis	Results
H1: The visual appeal of food is positively correlated with the taste of food.	Experimental research	Descriptive statistical analysis	Confirmed
H2: Differences in the age and level of education of consumers result in certain differences in terms of preferences in choosing healthy meals based on color as an element of the visual experience of food.	Survey research	Descriptive statistical analysis Cross-tabulation analysis	Confirmed
H3: Food that is aesthetically nicely arranged and contains intense colors is positively correlated with consumers' expectations regarding tasty and healthy food, as well as their intention to purchase (order) that dish.	Survey research	Exploratory factor analysis Multiple regression analysis Descriptive statistical analysis	Confirmed

Source: Author's calculations

Perceived differences in terms of preferences in choosing healthy meals based on the visual experience of food, indicate variability of eating behavior within consumers of different sociodemographic profiles. Furthermore, the results revealed that increased perceived meal with intense colors, that was aesthetically arranged, was associated with the consumer's intention to order the meal. The results of experimental research, which show the positive correlation between visual appeal and the taste of food, provide the support to the fact that focusing on visual cues is a natural approach to making food choices (Renner et al., 2016; Schulte - Mecklenbeck et al., 2013).

It was shown in a survey, that the working women with a university degree are the most interested in the visual aesthetics of food. The respondents emphasized the importance of visual aesthetics and the presence of intense colors in food, as well as that this directly affects their perception of that food as healthy and tasty, but it is difficult to explain in detail the exact influence of visual aesthetics on food choice. Based on the obtained results, it is emphasized that people are interested in food visual aesthetics, vivid colors and a healthy meal. These results confirm assumptions from previous literature and can be used for future research in this field.

Conclusion

The conducted research is an attempt to determine the impact of the meal visual aesthetics on the consumer's perception of a healthy and tasty meal. Through an analysis of different literature sources, as well as empirical research conducted for the purposes of writing this paper, it was determined that the visual appearance of food affects its visual appeal, as it contributes to the identification of food ingredients and generates expectations about the taste, freshness and quality of the meal. The results of the empirical research provide evidence for the idea that there are differences in consumer expectations regarding healthy and tasty meals, based on visual aesthetics

and colors. These results are in accordance with the knowledge obtained in the papers of a significant number of authors, which refer to the fact that the visual appearance of food affects the expectations of consumers regarding the taste of food (Ab Karim, Chi, 2010; Fieldhouse, 2013; Carrillo et al., 2011; Spinelli et al., 2014).

One of the main conclusion is that sociodemographic differences among consumers result in significant differences in terms of preferences in choosing healthy meals based on the visual experience of food. Also, the same research suggests that food, which is aesthetically arranged and contains intense colors, is positively correlated with consumers' expectations regarding tasty and healthy food, as well as their intention to purchase (order) that dish. The results showed the importance of visual aesthetics and the presence of intense colored ingredients in food, as well as that it directly affects consumer perception of that food as healthy and tasty. It can be said that this research complements the existing knowledge about the visual attractiveness and aesthetic experience of food on consumers, especially in the context of the food colors. The paper identifies the connection between the visual and real experience of delicious and healthy food, after tasting, which leads to the conclusion that the visual appeal of food is one of the attributes that influence the consumer's decision-making about the choice of food, with the open question if it is the dominant factor.

Theoretical and practical implications

Theoretical implications will complement the existing knowledge on sensory marketing, especially on the influence of the sense of sight on food choice. In addition, the results of this research have numerous practical implications in the field of sensory marketing, gastronomy and hospitality in general. Managers of hospitality companies must not ignore the fact that the visual aspect and the first impression of the appearance of the food on the plate influence the expectations related to the taste of the food. The first sight of food stimulates the appetite and the intention to order an aesthetically arranged and visually appealing meal. Bearing in mind that the human senses, especially the sense of sight, play a key and determining role in consumer behavior, the task of the restaurateur becomes clear: to intrigue the guest and awaken his senses, even before the first bite, with an attractive and aesthetically appealing presentation of food on the plate. Starting from the well-known that "the eyes eat", it is not wrong to say that the visual aesthetics of the served food becomes a significant factor in attracting and motivating consumers to return again and again to the offer of hospitality facilities and to recommend it to others, inspired by their own positive experience. Frequent repeated visits of consumers (guests) depend from the quality of gastronomic offer and their satisfaction with tasty, but also attractively designed and served food. Hence, by increasing the level of satisfaction of their visitors and the visual aspect of a deliciously prepared meal, restaurants get the opportunity to improve their competitiveness in the market and increase the level of profitability.

Limiting circumstances

There are certain limitations that should be taken into account in future research. In some future research, the influence of consumers' personal characteristics and their lifestyle on their perception of the visual appearance of the meal should be studied. Also, the influence of other factors should be taken into account, such as the combination of colors, the balance between colors, the color and shape of the plate, the position, the color of the background, and also the general atmosphere during the tasting. In particular, the connection between different color combinations and food characteristics, such as healthy and fresh food, should be research in detail. It must be also emphasized that understandings and attitudes related to the perception of visual aesthetics are different not only within certain groups of people, but also in different cultures and countries, which can be the inspiration for some future research by the authors.

Conflict of interests

The authors declare no conflict of interest.

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