

Marketing communications by Ukrainian food enterprises to improve consumer attitudes towards food additives

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Abstract

Keywords:

Food additive
Marketing
Consumers
Attitude

Introduction. The aim of the study was to investigate the marketing communication activities of food market enterprises in respect to enhancing consumer attitudes towards food additives.

Materials and methods. The online survey was conducted using single-stage cluster sampling, covering 621 respondents. The questionnaire was developed based on validated scientific surveys and consisted of 33 questions.

Results and discussion. Technological education has a significant impact on the consumer perception of food additives. 67.5% of consumers with such education trust labels versus 33.3% without such education, which indicates a significant impact of technological education on consumer behavior and perceptions regarding food additives, emphasizing its role in increasing awareness and frequency of label reading.

Technological education has a significant impact on consumer perception of food additives. 67.5% of consumers with technological education trust labels, versus 33.3% of consumers without such education. Thus, having a technological education plays a significant role in increasing consumer awareness and the frequency with which they read product labels. A statistically significant relationship was shown between technological education of consumers and the frequency of reading labels, as well as trust in the information on them ($p < 0.001$). Almost half of respondents (48.3%) believe that there is insufficient information about food additives on labels, with the main reasons being difficulties in understanding the nature of food additives (46.5%) and insufficient labeling (40.1%). Most consumers want to find more detailed and understandable information about food additives on labels: they expect to see the amount of food additives in the product (68.6%), the purpose of additive application (69.1%), recommendations for consumption (66.7%), and possible harmful effects (63.3%). To improve consumer attitudes towards food additives and enhance their trust in products, the study proposes an omnichannel approach to marketing communications, which includes the following key activities: (a) expanding the use of social networks and digital channels; (b) developing educational programs in partnership with specialized educational institutions; (c) improving information directly at points of sale by placing information stands in the entrance areas of supermarkets with brief explanations of the most common food additives; (d) introducing labels or QR codes on shelves near products with food additives; (e) adapting information for different consumer groups by using simple, and (f) understandable explanations for a general audience.

Conclusions. Increasing consumer knowledge of food additives will help to develop informed choices among them and strengthen trust in food producers.

Article history:

Received
20.12.2024
Received in
revised form
17.03.2025
Accepted
30.06.2025

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DOI:

10.24263/2304-
974X-2025-14-
2-12

Introduction

The modern food market is undergoing significant transformations under the influence of changes in consumer preferences, increased public awareness and demands for the quality and safety of food products. One of the most controversial topics in the food industry is the use of food additives, which are often perceived by consumers as dangerous or undesirable components.

Given the rapid development of the food additives market, consumers are concerned about the long-term and short-term risks of their consumption (Bearth et al., 2014). Much of the negative consumer attitude towards food additives is due to low levels of knowledge about them (Kostynets et al., 2023; Mnerie et al., 2015), lack of reliable information and the spread of myths in the media (Lanytsia, 2011). Consumers often rely on unofficial sources, social networks and rumors, which create mistrust of food manufacturers.

At the same time, global experience shows that competent communication campaigns based on scientifically sound data, transparency and open dialogue with consumers can significantly improve the perception of food additives (Mnerie et al., 2016; Shim et al., 2011), make consumer choices more conscious and increase brand loyalty.

Growing competition in the food market requires enterprises not only to ensure high quality products, but also to effectively manage their reputation and consumer trust. Marketing communications play a crucial role in this process by informing consumers about product composition, explaining the functions of food additives, and emphasizing their safety and compliance with international standards. This issue is especially relevant in the context of the spread of the concept of healthy eating (Asioli et al., 2017) and environmental awareness of the population (Kumar et al., 2021), which forces companies to find optimal ways to communicate with the audience.

Thus, the study of consumer attitudes towards food additives is extremely relevant. It allows not only to understand the effectiveness of various methods of forming a positive image of products using effective marketing communication strategies, but also to develop recommendations for enterprises on transparent and trusting communication with consumers. These strategies will contribute not only to sales growth, but also to raising public awareness of food additives, which is important for the development of innovations in the food industry.

Studies conducted in the USA, Korea, UAE, China, the UK, and other countries have revealed generally low levels of consumer awareness regarding food additives (Kayışoğlu et al., 2016; Koyratty et al., 2014). Research has shown that awareness and attitudes toward food additives are closely linked to educational level (Grujić et al., 2013; Miao et al., 2016), that the percentage of consumers who read food labels remains low (Koyratty et al., 2014), and that there is a clear need for simple and accessible information on food additives (Al-Ghamdi et al., 2021). Additionally, some studies have highlighted consumer awareness of the potential relationship between food additives and obesity (Ingram, 2020). However, research on these issues in Ukraine is very limited.

The aim of the present study was to substantiate the marketing communication activities of enterprises in the Ukrainian food market to improve consumer attitudes towards food additives, taking into account their level of knowledge and attitude towards the use of food additives in products.

Materials and methods

An online survey using a probability sampling method (cluster single-stage sampling) was conducted in October-November 2023. Data were collected and processed from 621 completed respondent questionnaires. The demographic profile of the sample is presented in Table 1.

Table 1

Demographic profile

Characteristics	Absolute value	Percentage, %
Gender		
Men	171	27.5
Women	450	72.5
Age (years)		
14-24	399	64.3
25-44	174	28.0
45-60	45	7.2
> 60	3	0.5
Education		
Technological	351	57.0
Other	270	43.0

The general methodology and questions of the questionnaire were formed using the experience of surveys described in the scientific literature: a survey on consumer awareness and perception of the safety of food additives (Shim et al., 2011), consumer perception of food additives and the most important variables associated with consumer acceptance of food additives (Bearth et al., 2014), level of consumer knowledge about food additives (Kayışoğlu et al., 2016), consumer knowledge and attitudes towards the use and safety of food additives (Osaili et al., 2023). The questionnaire consisted of 33 questions, which were divided into 6 conditional blocks:

- demographic information of respondents (age, gender, education);
- sources of information about food additives and trust in food labels;
- assessment of consumer knowledge about food additives;
- assessment of consumer attitudes towards food additives;
- assessment of consumer behavior towards food additives
- needs and suggestions of consumers regarding food additive labeling.

The questionnaire was formed using Google-Forms, the survey results were processed using IBM SPSS Statistics software.

Results and discussion

Sources of information about food additives

The main sources of information for respondents were the Internet/social media (82.9%), information on labels (73.7%), and food specialists (41.7%). The least frequently used sources of information were newspapers, magazines (8%), and government agencies or official information (13.7%) (Figure 1).



Figure 1. Sources of information about food additives (multiple answer, %)

Similar results regarding the source of information on food additives were reported in other studies (Osaili et al., 2023) – Internet/social media (69.3%), information on labels (63.4%). A study in the UK (Ismail et al., 2017) showed that the majority of respondents (56%) received information from radio and television programs, followed by the Internet (42%) and government information (36%).

As for trust in the information provided on the label, half of the respondents surveyed by the authors (52.7%) trust it, 11.6% of respondents do not trust this information, and another 35.7% of respondents are undecided. The presence of a significant proportion of respondents who do not have a clear position indicates the need to improve the transparency, accessibility and understandability of information on labels.

If this issue is considered in terms of respondent education, 67.5% of people with education trust the information on labels and only 33.3% without technological education trust such information. In the study of Osaili et al. (2023), the majority of respondents (46.2%) took a neutral position on trust in food labels, and only 34.9% of respondents trusted them sufficiently.

Media coverage of food additives, locations of food production, and local food regulatory inspection information all influence consumer trust in food labels (Coveney, 2008).

Assessing consumer knowledge and attitudes towards food additives

According to the knowledge of the respondents, the majority of them are aware of food additives such as malt (95.7%), rowan berries (95.2%), preservatives (91.8%), flavorings (91.3%). The least known food additives for consumers are anti-caking agents (29.0%), sodium benzoate (37.7%), SO₂ and sulfites (Figure 2).

Regarding consumer awareness of the use of individual food additives, the majority (71%) of respondents correctly answered that monosodium glutamate (MSG) is used to enhance the taste of food. This is higher than in a study conducted in Mauritius, where 44.4% of respondents knew that MSG is a flavor enhancer (Koyratty et al., 2014) and in a study (Osaili et al., 2023), where 33.8% knew this. 73.9% of respondents knew that gelatin gives food a gel-like consistency. In the study (Osaili et al., 2023), this percentage was higher – 80.5%.

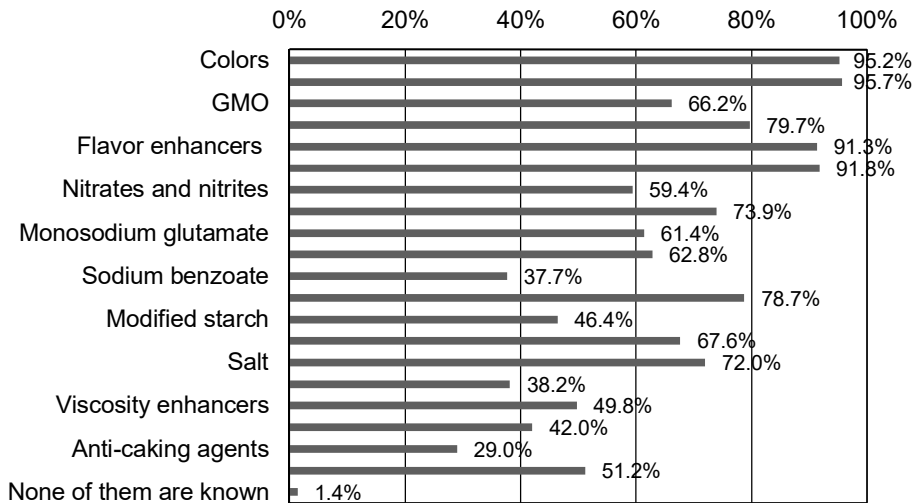


Figure 2. Respondent awareness of the presented types of food additives (multiple answer, %)

48.3% of respondents in the author's study knew of the effect of nitrates on food color. "In a comparable study by Osaili et al. (2023), only 25.7% of respondents were aware that nitrates are used as colorants in food products. The study also found that more than half of consumers knew that flour/semolina/oatmeal (90.3%), pickles (55.6%), nut butter (81.2%) and natural cheeses (77.8%) contained food additives (Figure 3).

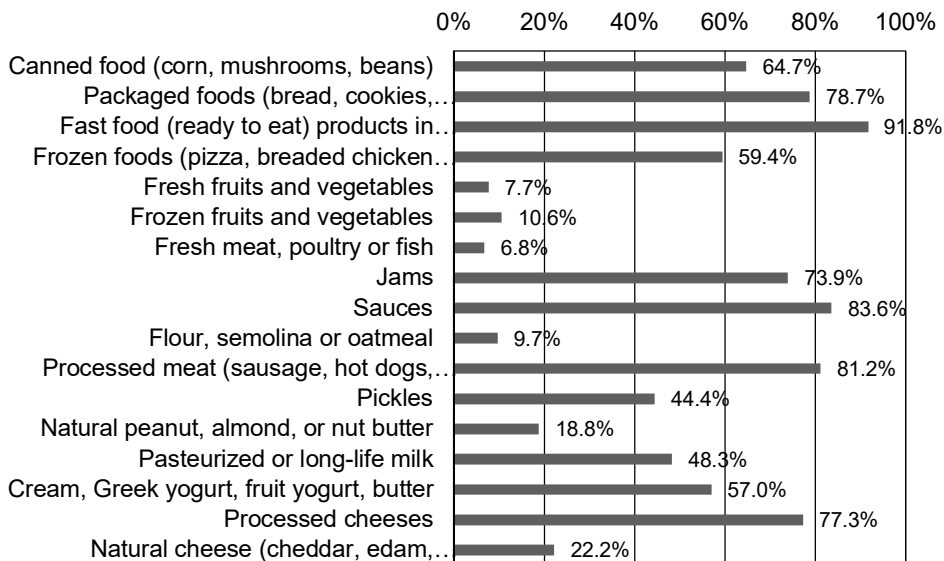


Figure 3. Consumer awareness of the content of food additives in certain food products (multiple answer, %)

However, a significant percentage of respondents knew that fresh meat/poultry/fish (93.2%), frozen fruits and vegetables (89.4%), and fresh fruits and vegetables (92.3%) did not contain food additives

According to the survey results, the majority of respondents (74.4%) agree with the statement that consuming processed foods containing preservatives is safe if it occurs within the permissible limits. This indicates a relatively high level of trust in the scientific and regulatory standards that determine the permissible amount of preservatives in food. At the same time, this trust is higher among respondents who have a technological education, in particular, 80.3% of such respondents agree with this statement, in contrast to 66.7% of respondents who do not have any other education. At the same time, 16.6% of respondents disagreed with this statement, which may be due to a skeptical attitude towards food additives in general, concerns about possible long-term health consequences, or the influence of negative information in the media. This indicates the existence of a group of consumers who avoid processed foods and prefer natural products. This indicates the existence of a group of consumers who avoid processed foods and prefer natural products. It is noteworthy that 9.7% of respondents selected the “don’t know” response. These respondents do not hold a clear opinion and can therefore be effectively targeted with marketing communications aimed at informing them about the safety of food additives.

Overall, the data obtained indicate a predominantly positive or neutral perception of preservatives in products, although there remain consumers who avoid them. This indicates the importance of marketing communication work by food market enterprises to explain the role of preservatives, their safety, and compliance with regulatory requirements.

An analysis of respondents' perceptions of the harmfulness of food additives shows that consumers have varying levels of concern about individual groups of food additives (Figure 4).

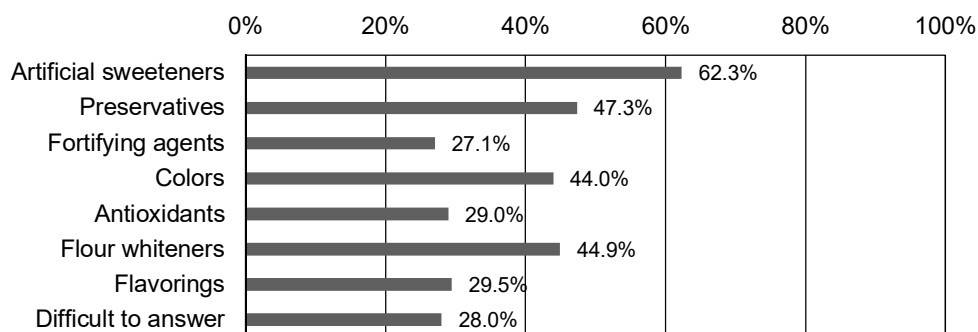


Figure 4. Respondents' opinion on the most harmful food additives for human health (multiple answer, %)

Artificial sweeteners caused the most negative perception (62.3%), which may be due to numerous discussions about their possible health effects, in particular regarding the increased risk of metabolic disorders, negative effects on intestinal microflora, and the possible carcinogenic effect of some substances.

However, it is worth noting that many studies do not confirm serious risks when artificial sweeteners are used within established norms. Preservatives were the second most concerned food additives (47.3%). This may be due to common stereotypes about their "chemical nature" and possible negative effects on the body, including allergic reactions and

digestive disorders. Consumers are particularly concerned about synthetic preservatives used to extend the shelf life of products. Flour bleaches are at a slightly lower level (44.9%), which is an interesting result, as this group of additives is less discussed. Perhaps consumers associate them with over-processing of products and the loss of beneficial properties of natural ingredients. It is known that some artificial food colors have been banned in various countries, which may have affected consumer perceptions of this category of food additives. So, artificial colors are associated with possible allergic reactions, especially in children (44%). Meanwhile, flavors (29.5%) are of moderate concern. This may be because natural flavors are often perceived as harmless, and the negative attitude is mostly directed at synthetic analogues, which can mask the low quality of raw materials. To a lesser extent, respondents are concerned about firming agents (27.1%) and antioxidants (29%). This may reflect a lack of consumer awareness of their role in food products. Antioxidants are commonly associated with positive health effects, which may explain their lower position in the harmfulness rankings.

The survey results show that consumers are most concerned about food additives that are widely discussed in the media and associated with potential health risks. At the same time, the level of mistrust towards certain additives may be due to a lack of reliable information or the spread of myths. This highlights the need for increased public awareness and transparency from manufacturers on the composition and functions of food additives in products.

A survey conducted in Germany found that respondents believed that flavour enhancers (84%), sweeteners (69%), and colors (64%) were unhealthy (Southey, 2021). Another 60% of respondents expressed concerns about preservatives, and 43% about emulsifiers. Survey questionnaire, which was provided among 430 Seoul residents, Korea, also showed consumer concerns about safety of preservatives, colors, and artificial sweeteners in foods (Shim et al., 2011). Based on the surveys conducted, it was found that respondents agreed that food additives are vital for the food industry because they provide better appearance and pleasant taste (Grujić et al., 2013), are used for food preservation (Ismail et al., 2017), and extend the shelf life of processed foods

(Al-Ghamdi et al., 2021). At the same time, respondents were concerned about their negative impact on health (Eiser et al., 2002). Regarding the use of food additives, the nature of origin and the risk of disease, only 20.8% of respondents indicated that they have sufficient knowledge on the use of food additives.

Finding out the knowledge of the respondents of this study on the purpose of using food additives showed that most of them believed that the purpose of adding food additives is to extend shelf life (93.7%), improve the taste and aroma of food (97.1%), and increase nutritional value (40.1%), improved consistency and texture (84.1%) and appearance and color (91.3%) (Figure 5).

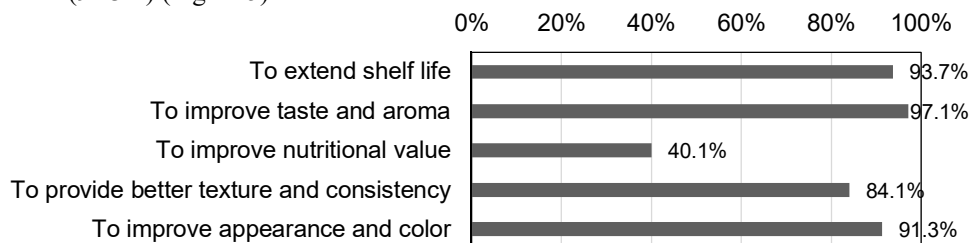


Figure 5. Respondents' opinion on the purpose of using food additives in food products (multiple answer, %)

An analysis of respondents' opinion on the purpose of using food additives shows that consumers have a clear understanding of the main functions of food additives in products. However, the level of acceptance of their use varies depending on the type of additive. Regarding improving taste and aroma, the largest part of respondents (97.1%) believe that food additives are used to improve the taste characteristics of products. This is quite an expected result, since taste and aroma are key factors influencing consumer choice. This includes flavor enhancers, flavors, and sweeteners, which are widely used in the manufacturing of beverages, confectionery, meat, and dairy products. The high level of agreement indicates that consumers have a good understanding of this function, although attitudes toward it can be both positive and negative.

The second most important function, according to respondents' opinion, is the function of extending shelf life (93.7%). This indicates that consumers understand that preservatives and antioxidants help prevent food spoilage, the development of microorganisms and oxidation. However, this aspect can also be a concern for consumers who have a negative perception of artificial preservatives, even if they are approved by regulatory authorities.

A large proportion of respondents (91.4%) recognized that additives are employed to improve the color and visual appeal of food products. Colors are widely used in the confectionery, meat and dairy industries, as well as in the production of beverages. At the same time, it is colors that are often perceived negatively due to their potential health effects, especially synthetic ones.

A slightly smaller, but still significant, number of respondents (84.1%) understand that food additives are also used to form the correct structure of products. Stabilizers, thickeners and emulsifiers play an important role in maintaining the uniformity and attractive appearance of many food products, including sauces, dairy products, ice cream and confectionery.

The smallest part of respondents (41.1%) know that the purpose of adding food additives is to increase the nutritional value of products. Such a low percentage of knowledge is because increasing the nutritional value of products is not the main purpose of using food additives.

Overall, the results of the survey shown in Figure 5, demonstrate that consumers are well aware of the functional role of food additives, especially in terms of improving taste, preservation of products, and their structure.

However, the relatively low understanding of the role of food additives in enhancing nutritional value suggests that additional information provided by manufacturers is needed. This could help change the perception of certain additives from negative to neutral or even positive, thereby increasing trust in food products.

In the study by Kayisoglu et al. (2016), 93.3% of respondents were informed that additives were added to increase shelf life, to improve taste and aroma (69%), and for appearance and color (63.7%). Similar results are shown in the study (Osaili et al., 2023), according to which 92.1% of respondents were reported that the purpose of adding food additives was to extend shelf life, 75.0% of respondents – to improve the taste and aroma of food, 23.5% – to increase nutritional value, 56.6% – to improve consistency and texture, 69.4% – to improve appearance and color. At the same time, it was shown that only 31.3% of respondents knew that food additives could be used to extend the shelf life of products. This indicates that knowledge about food additives varies among respondents from different countries, highlighting the need to inform the public about their role to support informed decision-making.

Most respondents (90.3%) believe that food-processing enterprises use various types of food additives during food production. Only 31.9% of respondents in this survey agreed that

food processing enterprises follow the food safety standards set by the government. At the same time, the percentage of respondents with technological education is higher than that of respondents with other education (38.5% versus 23.3%).

In the survey presented, less than half (31.9%) of respondents were confident that legally permitted food additives are safe. Almost the same percentage of respondents (31.4%) considered legally permitted food additives unsafe. At the same time, respondents with technological education are more likely to consider additives dangerous (37.6%) compared to those without such education (23.3%), which indicates both greater awareness of potential risks and a more critical attitude towards additives permitted by law. It should also be noted that the percentage of respondents who found it difficult to answer this question was excessively high (36.7%), which also indicates a lack of consumer awareness.

The survey of 300 people in the Tekirdag province, Turkey, showed that 74% of respondents consider food additives unsafe (Kayışoğlu et al., 2016). Interestingly, the results of another study showed that there was a significant difference in consumer responses before and after a campaign on food additive safety (Shim et al., 2011). Before this awareness campaign, only 14% considered food additives safe within acceptable limits; however, after the campaign, this percentage increased to 74%. This demonstrates the need to inform consumers about the safety of food additives in order to increase consumer trust in the food industry.

The analysis of consumers' perceptions of the safety of food additives in the present study showed that only 9.7% of respondents believe that all food additives are harmful to health. This indicates that the vast majority of consumers are aware of the fact that not all food additives are dangerous and that their effect depends on the type, dosage, and purpose of use.

However, a significant part of respondents has some concerns about the potential health effects of food additives:

- allergic reactions (40.5%). The possible development of allergies due to the consumption of products with food additives is the greatest concern. This can be explained by the increasing prevalence of allergic diseases, especially among children, as well as reports of a possible connection between some colors, flavor enhancers and allergic reactions;
- cancer. About a third of respondents (31.5%) believe that food additives can cause cancer. This opinion was probably formed under the influence of media publications, where certain synthetic additives (for example, nitrites in meat products) are associated with an increased risk of developing cancer. Although scientific studies confirm that the permissible levels of such substances are safe, the public still tends to be afraid of their consumption;
- skin rashes and swelling (31.3%). The same percentage of respondents believe that food additives can cause skin problems. This is probably due to the fact that certain colors, preservatives and flavor enhancers can be triggers of allergic reactions such as hives or dermatitis;
- respiratory problems. The smallest percentage of respondents (7.6%) expressed concern about the possible impact of food additives on the respiratory system. This may be due to exposure to sulfites, which in rare cases can cause asthma exacerbations or other reactions in sensitive individuals.
- According to the German Federal Institute for Risk Assessment, surveyed respondents most often associate the harmfulness of food additives with problems such as intolerance (27%), allergic reactions (26%), poisoning (23%), diabetes (17%), and cardiovascular diseases (10%) (Southey, 2021).

- In addition to possible health risks, consumers also noted the main reasons that increase their distrust in the safety of food additives:
- lack of trust in food manufacturers. The most important factor is the low level of trust in manufacturers. About 59.5% of respondents doubt that companies honestly declare the composition of products and comply with all regulatory requirements. This may be due to a lack of transparent communication or insufficient openness of brands regarding the quality and origin of ingredients;
- lack of knowledge on the topic. 40.5% of respondents admitted that they lacked knowledge about food additives. This indicates the need for communication campaigns that would help consumers better understand which additives are safe, which have clear regulatory standards, and what role they play in food products;
- negative media reports. A quarter of respondents (26.8%) noted that their concerns about food additives are largely influenced by negative media reports. The media often focus on sensational headlines, which creates panic among consumers, even if real scientific evidence does not confirm such risks.

The results obtained indicate that the absolute majority of consumers do not consider all food additives harmful, but there are a number of serious concerns related to their possible health effects. The biggest concerns are allergic reactions, cancer risks and skin problems. In addition, low trust in manufacturers, lack of information and the influence of negative media reports are key factors contributing to mistrust of food additives even within safe limits. These points to the need for transparent communication by food industry companies, active consumer awareness and dissemination of scientifically based information on the functions and safety of food additives.

It should be noted that earlier studies of consumer attitudes have shown that negative messages in the media and social networks are an important factor in the formation of mistrust of food additives by consumers (Shim et al., 2011).

Evaluation of consumer preferences regarding food additives

In our study, 37.2% of respondents consumed food containing additives daily, and 39.1% consumed such products 2-4 times a week. In the study provided in Saudi Arabia, 28.7% of the 868 participants purchased processed foods two to three times a week (Al-Ghamdi et al., 2021). It was shown that among food products containing food additives, the highest frequency of consumption was found for table salt (77.3% per day), followed by dairy products (38.2% per day), and the lowest consumption was for processed meat (0.6% per day) (Osaili et al., 2023).

A study (Aoki et al., 2010) showed that taste-related information has a greater influence on consumer choice and determines the purchase of a product, even if there is information about the presence of food additives in it. At the same time, a study (Southey, 2021) showed that among 1,015 respondents surveyed, 55% try to avoid potentially harmful food additives. In contrast, 40% indicated that the presence of additives does not affect their decision when purchasing food.

Among the factors influencing the purchase of products with food additives, the main ones were identified as the composition of ingredients on the label (42%), the price of the product (24.6%), and the brand (manufacturer) (19.8%).

According to the survey, about 64% of respondents plan to check information on food labels in the future. More than half (73.9% of consumers) said they would use information on food additives if the store provided it. It is worth noting that the obtained data are consistent with a study conducted in Korea, where 73.7% of respondents would be grateful

for information about food additives if it was provided by the seller (Shim et al., 2011). This indicates that consumers are willing to expand their knowledge about food additives and correct their misconceptions.

At the same time, less than half of the respondents (46.4%) reported that they read labels, 38.6% of respondents took a neutral position, and 15.0% of respondents do not read labels on food products. In particular, respondents with a technological education are significantly more likely to read labels (59.0%) compared to those without such education (30.0%). There is a statistically significant relationship between technology education and frequency of reading and trust in information on labels ($p < 0.001$) (Table 2).

Table 2

Relationship between socio-demographic variables and trust in information on labels and their reading frequency (n = 207)

Characteristics	Level of consumer trust in information on food labels (1-5)			Level of reading information on labels (1-5)		
	Mean	Standard deviation	P-value	Mean	Standard deviation	P-value
Gender						
Men	3.74	0.892	<0.001	3.30	1.158	0.08
Women	3.39	0.923		3.54	0.958	
Age (years)						
14–24	3.56	0.871	<0.001	3.25	1.008	<0.001
25–44	3.38	0.982		3.91	0.936	
45–60	3.07	1.009		3.67	0.798	
> 60	5.0	-		5.0	-	
Education						
Technological	3.79	0.687	<0.001	3.76	0.985	<0.001
Other	3.08	1.037		3.10	0.945	

Age groups also show differences in behavior ($p < 0.001$), in particular, the highest frequency of reading labels is observed in the 25–44 year old group, while respondents aged 14–24 years read labels the least. Regarding gender, the difference in label reading frequency between men and women is not statistically significant, although women show slightly higher scores. While standard deviations reflect moderate variability in scores, the lower values observed in the technology education groups indicate greater response consistency within these categories. This indicates that technological education and specialized knowledge of food additives significantly increase awareness and interest in the content of food labels. This finding is also consistent with the results of a study (Shim et al., 2011), which found that knowledge and understanding of food additive labels influences Korean consumers' label reading habits.

Therefore, an important aspect in consumer confidence in food products is the availability, clarity and completeness of the information provided on the labels. To determine the level of consumer satisfaction with this information, a question was asked whether they had enough information on food additives on the product labels.

The results of the study showed that almost half of respondents (48.3%) believe that there is insufficient information about food additives on labels.

The main reasons for this are:

- difficulty in understanding the nature of food additives (46.5%) – a large part of consumers do not have sufficient awareness of what certain additives mean, what functions they perform and how safe they are. This may be due to the use of complex terminology, scientific names or code designations (for example, “E-numbers”), which are not always understood by the general public;
- insufficient labeling, as 40.1% of respondents noted that labels lack detailed explanations of the functions of food additives, their origin and possible impact on health. Sometimes manufacturers provide only general designations without additional explanations, which can contribute to suspicion and mistrust on the part of consumers;
- indifference to the topic – some respondents (16.2%) noted that the issue of food additives does not interest them. This may indicate that for a certain segment of consumers, information campaigns on the composition of products are not a priority.

The results obtained are consistent with the research of other scientists (Osaili et al., 2023), in which 60.1% of respondents noted insufficient information on food labels. The main reasons for this were inadequate knowledge about food additives (46.5%) and difficulties in understanding the nature of food additives (41.6%). Another study conducted in Turkey found that only 13.3% of participants could easily understand information about food additives (Kayaşoğlu et al., 2016). 66.3% of respondents reported that they had difficulty in understanding this information, and 20.3% of respondents could not understand food labels at all. These points to a global problem of complexity in the presentation of information about the composition of products.

In Korea, however, the results were even more striking: 76.8% of respondents admitted that they had difficulty in understanding the topic of food additives (Shim et al., 2011). This was due to both the labelling features and the insufficient level of educational work on food safety.

An analysis of sources of information about food additives showed that consumers receive information from different sources, but the most popular are social media (67.1%) (Figure 6)

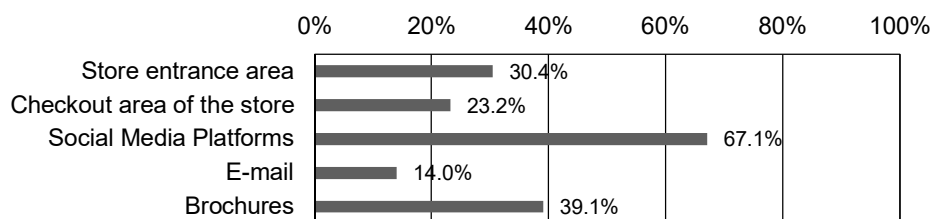


Figure 6. Priority methods for obtaining information about the existing food additives (multiple answer,%)

Similar results were obtained in the study of Osaili et al. (2023) where social media were recognized as the most preferred platforms for consumers to receive information about food additives (41.1%). This indicates the growing role of digital channels in disseminating knowledge about food products, in particular about their composition and safety.

- In addition to social media, respondents also noted the following sources of information:
- brochures. Printed materials such as booklets and leaflets remain an important way of delivering information for 39.1% of respondents, especially for those who prefer traditional formats;
 - information stands in the entrance area of stores – this channel is convenient for attracting the attention of 30.4% of buyers even before the start of the process of choosing goods;
 - checkout area of stores – short information messages or advertising materials near the checkouts serve as an effective method of conveying key facts to 23.2% of consumers while waiting in line;
 - emails – although this format is less popular compared to others, it remains relevant for those 14.9% of respondents who subscribe to newsletters from manufacturers or retail chains.

Consumer needs and suggestions regarding food additive labeling

Consumer suggestions regarding food additives include (a) clearer labeling (66.7%); (b) improvements in regulations and standards (54.6%); (c) more information and awareness (73.9%); and (d) decreased of their use (51.2%) (Figure 7).

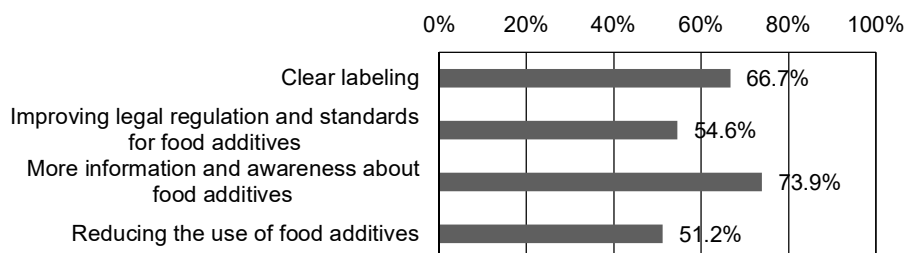


Figure 7. Consumer needs and suggestions regarding food additive labeling (multiple answer, %)

An analysis of consumer expectations for changes in the use of food additives and food labelling showed that consumers express specific desires for better information and regulation of the use of food additives in food products. The main aspects they would like to see changed include:

- clearer labeling (66.7%). More than two thirds of respondents believe that product labels should be designed in a more accessible and understandable form. This indicates the need to simplify terminology, explain the functions of food additives and improve the visual design of labeling;
- improvement of legal norms and standards (54.6%). More than half of the respondents say that it is necessary to strengthen control over the use of food additives through updating the legal framework, which indicates the importance of state regulation in this area;
- providing access to information about food additives (73.9%). Almost three quarters of respondents want to receive more reliable data about the composition of products and the influence of food additives on health, which indicates a significant demand for educational campaigns and initiatives from brands and regulatory bodies;
- reducing the use of food additives (51.2%). More than half of survey participants believe that manufacturers should limit the use of food additives in food products. This indicates a growing demand for natural and minimally processed products.

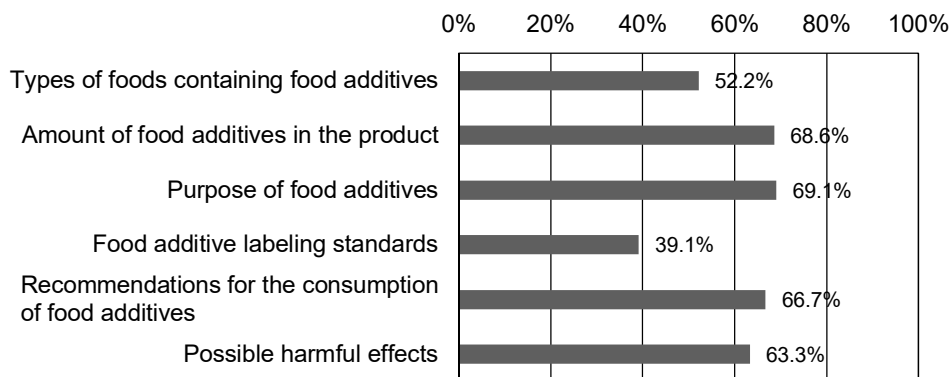


Figure 8. Consumer expectations regarding the information they would like to see on food labels (multiple answer, %)

The results of a survey on consumer suggestions for improving food-labeling show that the majority of consumers would like to receive more detailed and understandable information about food additives on product labels (Figure 8). Thus, respondents noted the following issues that, in their opinion, should be shown on the label (packaging):

- the amount of food additives in the product. 68.6% of respondents want to know the amount of added components, which will help them assess the level of processing of the product and its compliance with individual food preferences;
- the purpose of food additives. 69.1% of respondents want to understand the role of each additive plays in the product: preservative, flavor enhancer, coloring or thickener;
- recommendations for the consumption of food additives. 66.7% of respondents noted the need to provide information on acceptable consumption rates and conditions under which additives can be safe for health;
- possible harmful effects of using food additives. 63.3% of respondents want to see warnings about the potential risks of excessive consumption of certain additives, especially for vulnerable categories of the population (children, pregnant women, people with chronic diseases).

The survey showed that caution when purchasing food products with additives is caused by the following main factors:

1. Spreading myths and misinformation. The media, the Internet, and social media can be sources of myths and misinformation about food additives. The media and social media often spread information about the harms of food additives without scientific justification. Rumors and sensational news about "dangerous" E-additives can cause panic among consumers, even if these substances are actually permitted and safe in the prescribed doses. Various surveys have shown that people are concerned about the dangers of food additives and often find the "E" numbers mysterious (Ismail et al., 2017). The dishonest practices of some food manufacturers and the dissemination of false information have also led to consumers forming an erroneous opinion about food additives and their designation with the letter "E". When seeing such a mark on the packaging, some consumers refused to buy the product, associating it with information

about harm to health (Lanytsia, 2011). Therefore, such unreliable, incomplete information can lead to incorrect beliefs and decisions of consumers. 2.

2. Mistrust of food additive safety. Many consumers believe that food additives can have a negative impact on health. This is due to the spread of myths and lack of awareness about the functions and safety of various substances. Some additives (e.g. preservatives, colorants) are associated with allergic reactions, chronic diseases or carcinogenic effects, although their use is strictly regulated by international and national standards.
3. Confusing food labeling for consumers. Many consumers do not understand the meaning of complex chemical names or codes on labels of products containing food additives. This makes it difficult to choose healthy and safe products.
4. Lack of knowledge about food additives. Schools and other educational institutions do not provide enough information about food additives, their role in products, and their possible effects on health.
5. Effects of advertising and other marketing communications. Advertising may provide false information about the benefits of certain products containing food additives. This may lead to underestimation of the real benefits or possible risks.
6. Difficulty in understanding of product labeling and composition. Not all consumers possess sufficient knowledge to accurately interpret information on product labels. Designation of additives with codes (for example, "E621" instead of "monosodium glutamate") raises suspicions, although many such substances are safe and of natural origin. The lack of a detailed explanation on the packaging can increase the level of mistrust.
7. Naturalness and eco-friendliness in nutrition. The modern trend of healthy lifestyle and eco-friendly consumption makes people choose products with minimal processing and without artificial ingredients. Consumers tend to consider natural products more useful, even if some food additives (for example, antioxidants or probiotics) can have a positive effect on the body.
8. Consumer experience and personal beliefs. If a person or someone they know has had a negative experience with food additives (e.g. allergic reactions, digestive problems), they are more likely to avoid such products in the future. Cultural and religious beliefs also play an important role, as they may limit the use of certain additives.
9. Lack of transparent information from manufacturers. Trust in a product largely depends on the openness of the brand. If a company does not provide clear explanations for the use of certain additives in its products, the consumer may perceive this as concealment of important information and refuse to buy.

Thus, caution when purchasing products with food additives is a multifactorial phenomenon that combines emotional, informational and social aspects. To reduce bias, it is necessary to raise consumer awareness using effective marketing communication mix tools, ensure transparency in communication on the part of manufacturers and promote a scientifically based approach to assessing food additives.

Conclusions

1. A significant part of consumers lack accessible and understandable information about food additives. The main problems are complex terminology, insufficient detail of labelling and low awareness. In this regard, food manufacturers and relevant regulatory authorities are recommended to: (a) introduce more understandable labeling by including not only code designations (e.g., E-numbers) but also brief explanations of

the functions of each additive; (b) increase consumer awareness through educational campaigns and the publication of accessible explanatory materials; (c) ensure transparent communication by providing detailed information on the origin of food additives, their safety, and compliance with international standards. The implementation of these measures may help increase consumer confidence in food products and reduce their concerns about the use of food additives.

2. Based on the obtained results, the main areas of marketing communications are proposed to improve consumer awareness of food additives:
 - expanding the use of social networks and digital channels (creating short videos, infographics and interactive content to explain the functions of food additives; using popular platforms (Instagram, TikTok, Facebook, YouTube) to promote reliable information from food safety experts;
 - collaboration with authoritative experts, including doctors, dietitians and nutritionists. Conducting open lectures, podcasts, webinars and participating in conferences helps increase consumer confidence in the information provided. Inviting experts to television and radio broadcasts allows to convey scientifically based knowledge to a wide audience;
 - development of educational programs in partnership with specialized educational institutions. Inclusion of the topic of food additives in courses on the basics of healthy eating or integration of information into educational programs helps to increase consumer awareness;
 - regular publication of articles on the official websites of companies specializing in the production or sale of food additives allows consumers to be systematically acquainted with scientific research, recommendations and new products;
 - participation in industry forums and discussion platforms. Interaction with the professional community and active presence in specialized online communities contributes to the dissemination of verified information among interested parties;
 - optimization of printed materials (preparation of brochures and booklets with simple, accessible and visually attractive information about food additives; adding QR codes to printed materials to redirect consumers to more detailed digital sources);
 - improving information directly at points of sale by placing information stands in the entrance areas of supermarkets with brief explanations regarding the most common food additives; introducing labels or QR codes on shelves near products with food additives that would provide instant access to information about their composition and safety;
 - adaptation of information to different consumer groups by using simple and understandable explanations for a general audience; preparing more detailed materials for those who want to delve deeper into the topic; providing information in multiple languages to reach a wider range of consumers;
 - integrating information campaigns into loyalty programs motivates consumers to take an interest in healthy eating. For example, providing bonus points or discounts for completing online educational courses or viewing expert materials helps to increase awareness of food additives;
 - collaborations with well-known healthy food brands. Joint advertising campaigns, integration of products into “healthy diet” packages and joint promotions help increase trust in food supplements among health-conscious consumers;

- using gamification, which can increase the level of audience interest. Developing mobile applications or interactive web platforms where users can take knowledge tests on food additives, receive personalized recommendations and bonuses for activity motivates people to learn more about this topic;
 - cooperation with fitness centers, yoga studios and wellness communities. Partnership programs, seminars and placement of information materials in such establishments allow to convey useful information directly to people who are already interested in a healthy lifestyle;
 - development of the “transparent brand” concept. Manufacturers can talk about the processes of development and testing of food additives, share quality certificates, conduct open production tours and interactive Q&A sessions with experts. This will form the openness of the brand and increase consumer trust;
 - participation in charitable initiatives and social projects. Sponsorship of educational programs at specialized universities, support of public events on the topic of healthy nutrition and cooperation with health funds help to disseminate reliable information among a wide audience.
3. Marketing communications on food additives should be based not only on advertising activities, but also on deep interaction with the audience through educational initiatives, partnership projects and creation of a transparent brand image. A multi-channel approach to marketing communications, covering both personal interaction with consumers and digital and educational projects, is the key to effective information distribution on food additives and building trust in this product category.
- The study confirms that consumers receive information about food additives from a variety of sources, with digital channels playing an increasingly important role. However, traditional printed materials and point-of-sale information remain relevant. To increase public awareness and build trust in food products, it is necessary to implement an omnichannel approach to marketing communications that combines social media, printed materials, in-store information boards, digital technologies and other marketing communications tools. This will provide consumers with accessible, reliable and understandable information, which in turn will contribute to more informed food choices.
4. The findings indicate that consumers are seeking greater transparency in the use of food additives, improved product labeling, stricter regulation, and greater information about the health effects of food additives. At the same time, a significant proportion of respondents want to reduce the use of such ingredients in food products, indicating a growing trend towards natural and organic choices.
- Given consumer expectations, food brands, governments and other stakeholders can take the following steps to increase trust in food products:
- raising consumer awareness (conducting educational campaigns on food additive safety through social media, webinars, printed materials and events in supermarkets; creating independent online platforms where consumers can get expert advice on food additives);
 - strengthening control over food additives (implementing stricter safety standards and regularly updating them in accordance with new scientific research; increasing transparency in production by mandating disclosure of information on the origin and functions of each additive).
- Changing approaches to labeling, regulation and communication on food additives can significantly affect the level of consumer trust in food brands. The food industry must

adapt to modern society's demands, ensuring maximum transparency, accessibility of information and the transition to more natural ingredients in food production.

5. The results of survey indicate that the current level of food labeling does not meet consumer needs for accessible and comprehensive information about food additives. People want to know not only that a product contains certain additives, but also to understand why they are used, how much of them are in the composition, what are the safe consumption rates, and whether they can have a negative impact on health. This confirms the general trend towards conscious consumption, where consumers seek to make choices based on complete and reliable information. Food brands that adapt to these changes and provide more transparent data on labels can gain a competitive advantage and increase trust in their products. Therefore, in order to improve labeling and increase consumer awareness, it is recommended that when forming a communication mix:
- use detailed labeling (introducing information about the quantity and purpose of each food additive in the product in a simple and understandable form; using infographics, color markings or symbols for quick perception of information);
 - inform about possible risks and provide recommendations for consumption (applying warnings on packaging about potential health risks (e.g. for people with allergies or certain diseases); providing recommendations for consumption for different ages);
 - use digital solutions for expanded access to information (adding QR codes on packaging that lead to pages with detailed information about food additives; creating official online platforms with verified data on food additives and their impact on health);
 - adapt information to a wide range of consumers (avoid complex chemical terms and technical language that make understanding difficult; use clear explanations about the functions of additives and their proven safety).

Updating food labels to meet consumer needs will not only increase consumer awareness, but also strengthen trust in producers, promote more informed food choices, and reduce concerns about food additives. Transparency in this area is key to deserve the consumer loyalty and increasing the competitiveness of brands in the food sector.

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Cite:

UFJ Style

Boiko I., Bilyk O., Skryhun N., Kapinus L., Bilokhatniuk V. (2025), Marketing communications of enterprises of Ukrainian food market to improve consumer attitudes towards food additives, *Ukrainian Food Journal*, 14(2), pp. 354–374, <https://doi.org/10.24263/2304-974X-2025-14-2-12>

APA Style

Boiko, I., Bilyk, O., Skryhun, N., Kapinus, L., & Bilokhatniuk, V. (2025). Marketing communications of enterprises of Ukrainian food market to improve consumer attitudes towards food additives. *Ukrainian Food Journal*, 14(2), 354–374. <https://doi.org/10.24263/2304-974X-2025-14-2-12>
