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FOOD AND ENVIRONMENT SAFETY

THE ROLE OF FUNCTIONAL FOOD IN THE IMPROVEMENT OF CONSUMER'S HEALTH STATUS

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Abstract: *The main objective of this study is to present advances in understanding the relationship between nutrition and health that lead to the development of the concept of functional foods, which means a practical and new approach to achieve optimal health status by promoting the state of well-being and possibly reducing the risk of desease. For this purpose, the paper will look into the factors that influence consumers' awareness of functional foods and their purchasing decisions of functional food products in the Republic of Macedonia.*

The challenge of understanding the connection between diet and health has resulted in the creation of a new concept of functional products, which means a new practical approach to balance the diet with the aim to achieve optimal health and possibility to reduce the risk of deseases. Functional foods are foods that provide health benefits beyond basic nutrition ones. Biologically active compounds in functional foods may impart health benefits or desirable physiological effects. Increasing awareness of healthier food choices, its possibilities and advantages, provides higher quality of life. However, for a functional food product to be good and widely accepted, it is necessary to link research, marketing and relevant feedback information obtained by monitoring consumers' attitudes towards functional product, in order to meet consumers' expectations. One important fact in the whole concept of functional foods is informing consumers about the possibilities of functional foods, but any information relating to health must necessarily be true, attractive, simple and intelligible to the consumer so that the concept of functional foods being able in continuing to get developped.

Keywords: *functional food, consumer health, consumer buying behavior, marketing.*

1. Introduction

Food preference is determined by both nutrition and pleasure derived from food consumption. With the development, the "society of abundance" faces new challenges such as increasing costs for health care, extension of the life span of individuals, and the new scientific knowledge and new technologies lead to significant changes in the lifestyle. Due to all these, functional food plays a major role in improving the standard of living, balancing and maintaining maximum physiological functions, in preserving health and reducing the risk of diseases [1, 2]. Changes of consumer's attitudes about diet and the connection between diet and health can be achieved by placing an emphasis on targeted and balanced diet, maximizing physiological functions of the body in order to reduce the risk of disease or formulating functional food as an important source of specific nutrients from which are of great importance [2].

Although there is no existing unique and regulatory definition for functional foods, the scientific community agrees that those foods include a variety of foods and food components which are believed to improve overall health and well-being, reduce the risk of specific diseases, or minimize the effects of other health concerns. One of the most comprehensive definitions states that food can be regarded as functional "if it is satisfactorily demonstrated to affect beneficially one or more target functions of the body" [3]. Besides the usual foods seen as functional, like fruits and vegetables with their healthful components, breads and cereals made of whole grains, milk with its high intake of calcium, fortified foods and beverages, functional foods can also include dietary supplements.

Concept of functional food

The concept of balanced diet is a result of long research in the field of science of food and nutrition. A balanced diet is the most important support for the recommendations of dietary intake of certain nutrients. The beginning of the 21st century, however, puts the science of food in front of new challenges [4].

Food is no longer viewed only from the point of view of a need for adequate intake for proper growth, development and regeneration of the body. Food today has got a leading role in the quality of human life. For these reasons, balancing a diet grows at a level for optimal diet balancing, which focuses on optimizing the daily intake of both nutrients and nonnutritive components of food, in order to promote health and to reduce the risk of chronic, non-contagious diseases. Functional food plays an important role in the concept of optimally balanced diet. In 1998, the Japanese government set up a project in which they conducted research on the potential positive function of food in order to reduce the costs of medical treatment. The category of food with potential positive health effects, which occurs as a result of this research, is known as "food for specific non-medical purposes" (FOSHU food). This food category appeared in 1991 and is expected to exert certain, beneficial health effects as a result of the presence of certain components.

FOSHU (Food for Specified Health Uses) includes the set of rules for specific health statements for functional food [5, 6, 7, 8].

According to the Ministry of Health of Japan, FOSHU is [8]:

- Food that is expected to have specific health impacts due to its composition or food from which allergens are removed;
- Food in which the influence of additives or removed substances is scientifically validated and permits the claims about specific positive effect on health is obtained.

In most countries there are no legal definitions of the term "functional food" and the boundaries between conventional and functional food are challenge even for nutritionists and food technologists [9, 10]. Also, there are several different definitions for functional food (FF). One of the definitions that explain the concept of FF in a simple way is the definition which stipulates that some food can be called "functional" if in addition to its basic nutritional values, it affects one or more target functions of the body in a positive and satisfying way by reducing the risks of developing certain diseases [8]. Functional food can improve the overall health of the body, reduce the risk of various diseases, it can even be used during the treatment of certain disease states [9, 7]. IFIC (International Food Information Council) has given a definition which states that: Functional food is that food which provides greater health benefits than basic nutrition. FUFOSE (The European Commission Concerted Action on Functional Food Science in Europe) has

given the unique features of functional food:

- should be conventional and daily food;
- the possibility of consumption as a part of normal diet;
- natural (as opposed to synthetic) with components that can be naturally found in the food or added to the food to a greater amount of the concentration specific to the food;
- has a positive effect on physiological functions;
- can improve the overall health and reduce the risk of disease;
- has confirmed and substantiated health claims. [8, 3]

Functional food may not necessarily be functional for the entire population and the combination of individual biochemical needs with specific food components can affect the progress in understanding the interaction between genes and diet. However, it is very important to understand the distinction between food and medicine. If indications for the treatment or prevention of certain diseases are recognized in a product, then the product is a medicine and a certain degree of toxicity is tolerant, but if indications for treatment or prevention of certain diseases are not recognized in the product, then it is a food and in this case, in normal amounts it must not cause any toxic effects.

Economic aspects of the development of functional food

The market of functional food

Functional food market is constantly changing and the competition in winning consumers is growing relentlessly and bluntly. Key factors affecting the purchase of products represent a recurring cycle that shows the relationship between quality, price, convenience and ease of preparation and of course, a positive impact on health, which means that Functional food or Functional food manufacturers must find a response to consumers' demands for convenient and easy preparation, positive health impact and of course, the good taste. Also, it should not be forgotten that consumers are not willing to compromise at the expense of taste, in favour of a positive impact on health [11]. To be an excellent Functional food product, it must offer special health properties, and at the same time when compared with conventional food, it must develop its own strategy by linking research and marketing [9].

It is necessary to monitor consumers' attitude towards a product so that it is possible, to a measurable way, to establish the idea of products and that the new product meets consumer's expectations and that all information relating to health are truthful and attractive. By tracking consumer's attitudes, the development of new methods of market research and consumer's preferences large losses in investments can be reduced [12].

Development and marketing of functional food

Functional food is a sustainable food category on the market due to long-term trends in the society, such as socio-demographic trends [13,14,15] which imply a higher life standard, longer life expectancy, better health care, higher level of education in a large part of the population, and more. Scientists and, most importantly, consumers are beginning to accept the fact about the connection between health and nutrition [7].

Consumers are more and more informed about health aspects of proper nutrition and willingly accept the changes in their eating habits [16, 17].

The aspect in which functional food helps preserving the overall health status and/or reduces and prevents the risk of developing

certain diseases is not negligible. It is also beyond doubt that increasing awareness of health food choices, its possibilities and advantages indirectly provides increased quality of life, and affects the reduction of the mortality rate, which in the end is of economic and public interest [14, 18]. It should be taken into account that the prices of functional food are higher than those of conventional food which seems to be of interest for all the participants in the supply chain [19]. The development of new functional components and technological solutions can be expensive and it requires a large research effort.This involves identification of the functional components and determining their physiological impact; development of suitable matrix products, determination of the bioavailability of functional components and their potential changes during processing and preparation of the products, consumer's education and clinical studies on the safety and efficacy of the product to obtain approval for use of claim about the positive health impact [19, 17].

All these represent a multi-stage process in which commercial, academic and legal inputs or legal interests are required, all with the aim of achieving recognition and acceptance by consumers [14]. The acceptance of the concept of functional food and better understanding of its determinants by the consumers has been identified as a key factor for market orientation towards functional food, product development driven by the feedback from customers and market opportunities [4, 20]. The acceptance of functional food or such product by consumers depends largely on the socio-demographic factors such as level of education, place of residence, presence of children in the household, gender and age. On the basis of the socio-demographic factors it can be stated that typical consumers of functional food are persons with higher levels of education, older people and people with health problems who must adhere to a specific diet regime. From the point of view of gender, women are more frequent consumers and they are more interested in functional foods than men [17].

2. Matherial and methods

Considering the fact that the subject of this research is consumer's behavior towards functional food in the Republic of Macedonia, the main group consists of respondents aged over 18 years.

The research was conducted on a sample case. The research involved participants from the northeast and southwest of the Republic of Macedonia.

500 questionnaires that were defined as a target group were made for the survey, but relatively low turnout of participants always occurs with the use of written surveys. Thus, from the total number of 500 distributed surveys (450 electronic and 50 physical) only 313 surveys were answered and only those involved in the further analysis, which is of 62.6%. From all the respondents, only 198 respondents answered that they were familiar with the concept of functional food, which represents 63.26% of their total number. The respondents who were not familiar with the term were excluded from further analysis. Statistical methods were used in the analysis of data collected by polling. When determining the demographic and socio-economic features, distribution of respondents by place of residence, gender, age, qualification and monthly income was determined. Within the analysis of ordinal variables, the selected indicators of descriptive statistics were calculated, while the nominal variables were determined by the respective distributions. Hi-square test was applied to test reliability of the

selected features. Statistically significant differences are considered the differences confirmed at the level of $p<0.05$.

3. Results and discussion

Part of the questionnaire contained questions related to the consumer's familiarity with the concept of functional food and their buying habits associated with such products. As previously pointed out, 198 of the 313 subjects included in the study (63.26%) have heard of the term "functional food". Table 1 contains the distribution of respondents considering their position on what the term "functional food" means for them.

Table 1

The distribution of respondents due to the perception of the term "functional food"

The perception of the term "functional foods"	Number of respondents	Percentage
Healthy food	17	8.59
Food with specific benefits to the body	144	72.73
Expensive food	1	0.51
All above	36	18.18
Total	**198**	**100.00**

For most of them the term "functional food" means food with certain benefits for the system. Only one respondent thinks that "functional food" is expensive food.

Table 2 presents the distribution of respondents according to the defined characteristics (residence, gender, age, education and monthly income) and the perception of the term "functional food". The table also lists the results of hi-square test for independence of the features that is used to examine the relationship between the defined features and the term "functional food". Since only one person had a position that functional food is expensive food, in order to satisfy the assumptions of the tests, that answer was neglected in the analysis.

In all the groups analyzed there are persons who perceive functional food as food with specific benefits to the body. Among the respondents from the northeast part of Macedonia, as well as those from the southeast, the number of persons who perceive the term "functional food" as all together (healthy food, food with specific benefits to the body and expensive food) is higher, while the number of those who perceive the functional food only as a healthy food is lower. The same characteristic was registered by the distribution of responses by gender. According to the hi-square test there is no statistically significant relationship between the place of residence and the perception of the term "functional food". Also, there is no statistically significant dependence between the gender and the perception of the term "functional food".

The existence of statistically significant relationship between age and perception of the term "functional food" is confirmed by hi-square test. In all age groups, as already noted, most respondents answered that functional food is food with certain benefits to the body. These respondents were most prevalent in the older age group, and least prevalent in the young age group. Regarding the other respondents, the youngest respondents in greater number have perceived the term "functional food" as being all previously stated (healthy foods, foods with specific benefits to the body and expensive food). In the older group, the number of respondents who

perceived functional foods as healthy food and as all stated was equal.

Table 2

Distribution of respondents according to the defined characteristics and the perception of the term "functional food" with the results by the chi-square test

Characteristics	Perception of the term "functional food"			Chi-square test
	Healthy food	Food with particular benefits for the organism	As all together	
Residence				
Northeast part of Macedonia	14 (12.39%)	80 (70.80%)	19 (16.81%)	X^2=4.842 p=0.089
Southwest part of Macedonia	3 (3.57%)	64 (76.19%)	17 (20.24%)	
Gender				
Male	4 (4.44%)	70 (77.78%)	16 (17.78%	X^2=3.882 p=0.144
Female	13 (12.15%)	74 (69.16%)	20 (18.69%)	
Age				
under 24	8 (10.53%)	46 (60.53%)	22 (28.95%)	X^2=13.621 p=0.009
25-38	7 (8.75%)	61 (76.25%)	12 (15.00%)	
39 or more	2 (4.88%)	37 (90.24%)	2 (4.88%)	
Education				
University education	11 (13.10%)	63 (75%)	22 (11.90%)	X^2=6.74 p=0.035
Secondary education	6 (5.36%)	80 (71.43%)	26 (23.21%)	
Monthtly income (denars)				
less than 10.000,00	7 (11.67%)	30 (50.00%)	23 (38.33%)	X^2=33.338 P<0.001
10.000,00-30.000,00	2 (2.47%)	73 (90.12%)	6 (7.41%)	
to 30.000,00 or more	8 (14.29%)	41 (73.21%)	7 (12.50%)	

According to the hi-square test, there is statistically significant relationship between the professional qualification and the perception of the term "functional food". The percentage of persons who associate functional food with healthy food with specific benefits for the body was equal in both groups. But, compared with those who had secondary education, among those with university education, there were people who perceived the functional food as healthy food. The percentage of people with secondary education who experienced functional food as all stated was greater than the group of respondents with university education.

The hi-square test confirmed the existence of a statistically significant relationship between the monthly income and the perception of the term "functional food". The largest percent is that of respondents

who perceive functional food as food with specific benefits to the body, determined among those who earn between 10 000,00 and 30000,00 per month. Such persons are less recorded in the lowest profitable group. In the group with the least income, the number of persons who stated that they associate the term "functional food" with all stated (healthy food, food with specific benefits to the body and expensive food) is significant. The percentage of respondents who perceive functional food as a healthy food was the highest among respondents whose monthly income amounted to 30.000,00 denars or more. The questionnaire contained two questions related to the participation in the buying of functional food and functional beverages. Respondents' answers to these questions were measured on Likert scale which has 4 degrees (1 – never, 2 - occasionally, 3 – often, 4 - regularly).

Table 3 contains selected indicators from the descriptive statistics (arithmetic mean, median, mode, standard deviation and coefficient of variation) calculated for the two mentioned variables.

Table 3

Selected descriptive statistical indicators relating to the frequency of purchase

Frequency of purchase	Arithmetic mean	Median	Mode	Standard deviation	Coefficients of variation
Functional food	2.35	2.00	2.00	0.71	30.18
Functional beverages	2.05	2.00	2.00	0.69	33.52

Although there are conflicting opinions on the use of mean and its key indicators in the case of measured variables on the Likert scale, we applied them in the analysis in order to facilitate decision making. Based on the calculated arithmetic mean it can be concluded that respondents buy more functional food than functional beverages. In both cases, the median had the same value. According to the median, half of the respondents expressed purchase frequency of functional food and functional beverages by 2 or lower, and the other half by 2 or higher. And, in both cases the mode has a value of 2. Thus, most respondents answered that they bought functional food and functional beverages. The standard deviation and coefficient of variation suggest that the degree of variability in the response to both questions can be considered small. Table 4 contains the distribution of respondents according to the category of functional food that they usually buy.

Table 4

Distribution of respondents considering the category of functional foods usually bought

Categories of functional food	Number of respondents	Percentage
Dairy products	70	36.27
Products enriched with omega-3 fatty acids	27	13.99
Fruit juices	46	23.83
Other products	15	7.77
All above	35	18.13
Total	193	100.00

The results showed that five respondents who had heard of the term "functional food" never bought such products.

Most respondents answered that they usually bought dairy products as functional food, which make up more than a third of the respondents. The next respondents are

those who answered that they buy fruit juices.
All stated (dairy products, products enriched with omega-3 fatty acids, fruit juices and other products) are usually bought by less than the fifth of the respondents. The number of persons who answered that they usually buy other products was the least.

4. Conclusion

Functional food is a promising and dynamic part of the food industry that is rapidly evolving thanks to a better understanding of the close connection between diet and health.Therefore, it is necessary to develop a new approach on the development of new products for consumers. The presentation of functional food is not successful unless it is not carried out simultaneously with successful informing of consumers. The information and the increased awareness of the opportunities of healthy eating allow easier choice in buying the products and their inclusion in the daily diet. With an increasing demand for a healthy lifestyle and general well-being, food and drink manufacturers are provided with opportunities to reformulate their products to address the needs on this emerging market. Among these ones, fortified/functional food and drinks has been the most dynamic and fast moving category of new product development on the health and wellness market. Although the enhanced health benefits attracted consumers' attention, concerns on the artificial ingredients and effectiveness of the health benefits have formed negative attitudes towards functional products. Thus, the understanding of factors which influence consumers' perceptions and acceptances of functional food is essential for food and drink manufacturers in their New Product Development (NPD) strategies making. Factors that affect the increasing development of functional products are aging population, increasing costs for Health care, autonomy in health care and awareness and desire to improve personal health, new research and scientific evidence that diet can change the frequency and progression of a disease.
In the conducted research, for most of the respondents the term "functional food" is food with certain benefits to the body.
A frequency of respondents is made according to the defined characteristics (residence, gender, age, education and monthly income) and the perception of the term "functional food". Most respondents answered that they buy occasionally functional food and functional beverages. The standard deviation and the coefficient of variation suggest that the degree of variability in the response of both questions may be considered small, suggesting that the trend of functional food is accepted.
Most of the respondents stated that they mostly buy dairy products as functional food. This was the case of more than a third of the respondents. Then, there come the respondents who answered that they buy fruit juices.
It can be concluded that functional food as a product among the consumers of the Republic of Macedonia was accepted, but there are significant differences depending on the place of residence, monthly income, age and education of the consumers who have a major influence on the purchase decision.
However, functional food for the Macedonian food industry is a promising category primarily due to the greater expressiveness and close connection between food and health, the innovation in the food industry, and the consumer's awareness.

The information and the increase of the awareness for healthy diet options influence the decision making of purchasing products and of more frequent and regular usage. For this purpose, the Macedonian food industry should take maximum advantage of their potential and adapt to the European and world trends to produce functional food and thus, to increase the financial results, but also to influence the change of Macedonia customers' food habits.

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