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STUDY ON CONSUMERS PERCEPTION AND KNOWLEDGE ON VEGETAL ORGANIC BY-PRODUCTS USED AS FUNCTIONAL INGREDIENTS

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Abstract

In recent years the increase in demand and consumption of minimally processed organic products has been more and more desired because of the consumer awareness of a healthier diet, as well as the responsibility for the environment sustainability. Consumers expect a better quality for these organic products compared to conventional ones, thus referring to a lower content of pesticide residues and additives, respectively better nutritional and quality attributes. This study provides a perspective on the consumer behaviour and attitude toward organic food products enriched in value by adding nutrients resulting from the minimally processing of organic fruits and vegetables. The research is based on a survey answered by 547 respondents and which uses a questionnaire designed based on the literature and the conclusions previously obtained in an ongoing research project.

Key words**:** *organic products, minimal processing, functional ingredients*

INTRODUCTION

Worldwide, approximate 30% of globally produced food is lost or wasted at some point along the food chain [8, 15, 17], starting from harvesting and production/processing to handling, distribution and consumption [15]. These facts lead to an inappropriate use of resources, such as freshwater, land, fertilizer or energy used to produce these food products, also contributing to environmental pollution [8, 15]. For the successful implementation of the principles of the circular economy, food waste should be reduced [5]. Under these aspects, food waste could be used, among others, as a sustainable supply of high-value nutrients obtained through green techniques [19].

Fruits and vegetables represent a great source of nutrients, having a series of health benefits, being vital to human consumption [1]. Most consumers are not meeting the daily recommended intake of fruits and vegetables; still the quantity of fruit and vegetable waste is high [3]. Fruit processing contribute with more than 0.5 billion tons of waste globally [4]. The by-products generated from processing could be further processed or treated for obtaining secondary raw materials in the form of functional ingredients [17]. Lately, fruit and vegetable waste presented great interest in obtaining such as flavoring agents, nutraceuticals or bioactive compounds [12]. This fact related to their rich composition in proteins, carbohydrates, lipids and bioactive compounds [11], such as pectin, flavonoids, dietary fibers [4], polyphenols, anthocyanins, etc. Recent research focused on the recovery of fruit and vegetable waste for production of value-added products (functional foods), in order to increase sustainability of healthy diets and to reduce the environmental footprint [3]; the success of developing such products depending on their

perception by consumers [16]. Understanding consumer attitudes and preferences, knowledge and behavior is very important for the decision-makers in setting food policies, legislation and research and development directions within society [18]. Considering these aspects, the aim of this study was to determine the consumer perception and knowledge regarding organic food products enriched in value by adding nutrients resulting from the processing of organic fruits and vegetables.

MATERIALS AND METHODS

Marketing research techniques use various methods of investigation that are based on direct information and data, indirect information, and qualitative/quantitative methods. The survey method, the interview method, the focus group method, etc., are some examples of investigation methods. In the present study, the questionnaire-based method was used to process the data and information collected, this method being one of the most used in socio-economic research [10, 6].

Quantitative and qualitative research often uses the questionnaire method because it can provide information on the socio-economic characteristics regarding the attitude and behaviour of the consumer. This method is the most used technique in order to evaluate the factors that influence the consumption behaviour [10, 7, 6].

The questionnaire used in this research study was designed and completed in 2021, between August and September and consisted of interviewing a number of 547 respondents. The questionnaire used was designed based on the scientific literature and on the results obtained in an ongoing research project [2, 9, 13, 14]. The questionnaire includes three sections: the first section is comprised of 7 questions regarding the consumer behaviour of the respondents, the second part has 5 questions regarding the demographic profile, and the third part has 9 questions that are comprised of a multidimensional scale made to measure consumer attitude and preferences towards enriched food products by adding nutrients resulting from the processing of organic vegetables and fruits by-products.

The questions used in designing the questionnaire are closed dichotomous questions, questions with choice answers and open questions, respectively. Closed dichotomous questions are those to which only two answers are available, i.e.: "yes" or "no", "man" or "woman". The questions that have a limited number of answers from which you can choose one are called semi-opened questions, and the opened questions are the ones that the respondents can write their own opinion [6].

To establish the consumer's perception towards the nutritionally enriched organic foods, a set of 9 statements with a metric scale, of the Likert type in five points (total disagreement/disagreement/indecisive/ agreement/total agreement) was used. The age of the respondents ranged from 18 to 65.

RESULTS AND DISCUSSIONS

The designed questionnaire on the preferences for the consumption of nutritionally improved organic products was distributed and completed by a number of 547 respondents.

By analysing the obtained data, the survey participants were mostly women (78.4%) aged between 26 and 59 years (76.9%). Furthermore, it can be observed that 236 of them were aged between 26 - 39 and 184 from 40 to 59 years old. As a percentage, this can be expressed as follows: on the segment 26 - 39 years out of the 236 respondents, 75.85% are women, 24.15% men, and on the range 40 - 59 years out of the 184 people, 80.98 % are women and 19.02% are men.

Table 1. Distribution of respondents by age depending on gender

	Men	Women	Grand Total
18 - 25 years	13	56	69
26 - 39 years	57	179	236
40 - 59 years	35	149	184
60 years or more	14	44	58
Grand Total	**119**	**428**	**547**

Source: Own calculation.

Regarding the education level of the respondents (Table 2), it can be seen that approximately 70% have graduated a college and a master's degree, and 22.22% have a doctorate in the field, while only 9.75% have graduated high school.

Table 2. Distribution of respondents by age depending on education level

	PhD	University	High school	MsC/MBA	Grand Total
18 - 25 years	0.00%	7.41%	2.53%	2.14%	12.09%
26 - 39 years	7.41%	11.50%	2.53%	22.22%	43.66%
40 - 59 years	12.67%	9.94%	3.70%	7.41%	33.72%
60 years or more	2.14%	5.65%	0.97%	1.75%	10.53%
Grand Total	**22.22%**	**34.50%**	**9.75%**	**33.53%**	**100.00%**

Source: Own calculation.

Regarding the respondents' monthly income (Table 3) it can be observed that most of them, 22.84% have a monthly income over 8,500 lei, followed by 18.31% with a monthly income between 2,500 and 3,500 lei, 16.46% between 6,501 and 8,500 lei, while with an income below 2,500 lei are only 6.17% of respondents.

Table 3. Distribution of respondents by age depending on income

	2500-3500 LEI	3501-4500 LEI	4501-5500 LEI	5501-6500 LEI	6501-8500 LEI	>8500 LEI	<2500 LEI	Grand Total
18-25 years	4.12%	1.65%	1.65%	0.41%	0.41%	1.65%	1.44%	11.32%
26-39 years	6.38%	6.38%	6.17%	4.94%	7.61%	10.49%	1.65%	43.62%
40-59 years	5.14%	3.50%	4.12%	3.29%	7.20%	9.05%	2.47%	34.77%
60 years or more	2.67%	1.03%	1.85%	1.23%	1.23%	1.65%	0.62%	10.29%
Grand Total	**18.31 %**	**12.55 %**	**13.79 %**	**9.88 %**	**16.46 %**	**22.84 %**	**6.17 %**	**100.00 %**

Source: Own calculation.

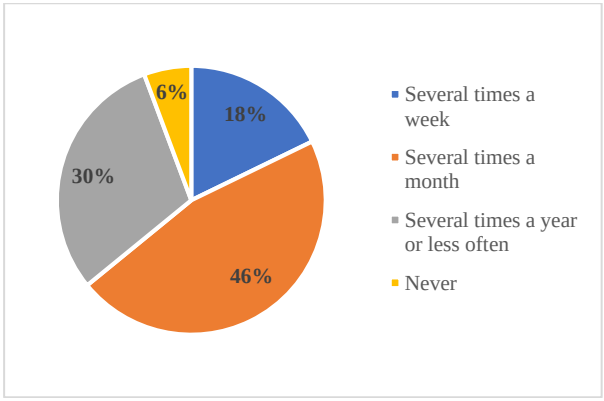

Fig. 1. Frequency of shopping
Source: Own calculation.

Most of the respondents (76.5%) buy certified organic products several times a month/a year or rarely, while 6% do not buy such products (Fig. 1).

In Table 4 it can be seen that no matter the age, 46.34% of respondents consume fortified foods by adding valuable nutrients in the form of extracts, while 5.68% mentioned that they never consume such products.

Table 4. Frequency of consumption of enriched products depending on age

	several times a year or less	several times a month	several times a week	never	Grand Total
18-25 years	3.30%	7.14%	1.10%	1.10%	12.64%
26-39 years	14.84%	19.23%	7.51%	1.65%	43.22%
40-59 years	10.26%	15.38%	6.59%	1.47%	33.70%
60 ani or more	1.83%	4.58%	2.56%	1.47%	10.44%
Grand Total	30.22%	46.34%	17.77%	5.68%	100.00%

Source: Own calculation.

Distribution by age of the answers regarding the use of the information on the product label is presented in Table 5. No matter the age, more than half of the respondents (55.75%) read the entire label, 41.38% read only partial information and 2.87% of them do not read the product label.

Table 5. Distribution of answers regarding the use of the label by age

	totally	never	partially	Grand Total
18-25 years	5.75%	0.29%	6.90%	12.93%
26-39 years	19.25%	2.59%	20.11%	41.95%
40-59 years	21.84%	0.00%	12.36%	34.20%
60 years or more	8.91%	0.00%	2.01%	10.92%
Grand Total	**55.75%**	**2.87%**	**41.38%**	**100.00%**

Source: Own calculation.

The respondents are mostly interested in the ingredient (72.6%) and product expiration date (71.1%), considering that these are the most important information on the product label. More than half of the respondents consider that the origin of the product is important (61.1%) and also the ecological certification (52.3%).

Nutritional information and information about the producer are of interest to less than half of the respondents (45.4%, respectively 40.3%). The fewest of them, about 0.3% are interested

in allergens that can be found in the food product (Fig. 2).

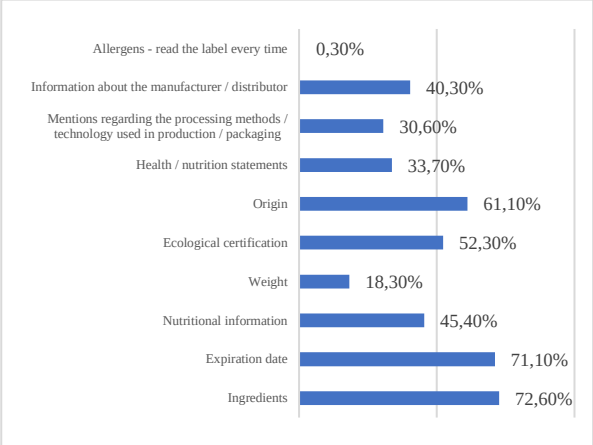

Fig. 2. Food label information
Source: Own calculation.

Among the foods enriched by the addition of valuable nutrients in the form of extracts known by the respondents, bakery products occupy the first place (40.7%), immediately after being dairy products (37.2%). 26.9% of the respondents do not know any food products enriched with nutritional compounds, while 8.6% do not consume such products. Some of such food products known by the respondents (other than the ones stated within the survey) are snack bars, fruit juices and purees, smoothies and food supplements, cereals and yogurts.

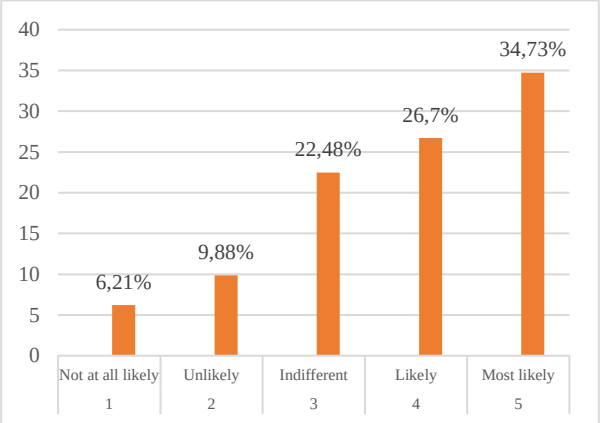

Fig. 3. Probability of buying nutritionally enriched food products
Source: Own calculation.

The probability of buying nutritionally enriched foods (Fig. 3) is of 61.5% (*most likely*, respectively *likely*), while 6.2% of the respondents are *not likely* to buy such products.

When asked about the obligation of to mention on the label the use of waste from the food industry as ingredients, 93% of the respondents agreed with the obligation to mention on the label the use of waste from the food industry as ingredients for food production.

Table 6. The person responsible for the household supply

	Men	Women	Grand Total
Other family members	1.46%	1.65%	3.11%
Both me and other family members	11.15%	41.86%	53.02%
Myself	9.14%	34.73%	43.88%
Grand Total	**21.76%**	**78.24%**	**100.00%**

Source: Own calculation.

43.88% of respondents are the main responsible for shopping for their household, while 53.02% share this task with other family members and only 3.11% depend on other family members (Table 6).

When asked if they heard any promoting campaign of such products, half of the respondents (50.00%) agreed with the fact that these products are not enough promoted and there are no promoting campaigns for them, the distribution on age being 39.19% women and 10.81% men. In a percentage of 24.18%, more precisely 18.13% women and 6.04% men, the respondents consider that these products are promoted enough. The rest of the respondents (25.82%) do not have knowledge about promoting campaigns of such products (Table 7).

Table 7. Consumer agreement/disagreement with advertising campaigns

	Men	Women	Grand Total
Agree	10.81%	39.19%	50.00%
I don't know	4.76%	21.06%	25.82%
Disagree	6.04%	18.13%	24.18%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

Three quarters of respondents, respectively 75.64%, agree that food waste resulting from the processing of vegetables and fruits contains valuable nutrients, such as vitamin C,

antioxidants, etc. while 6.23% do not agree with this affirmation (Table 8).

Table 8. Consumer agreement / disagreement with the nutrient content of food waste

	Men	Women	Grand Total
Agree	15.93%	59.71%	75.64%
I don't know	3.48%	14.65%	18.13%
Disagree	2.20%	4.03%	6.23%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

Regarding the affirmation of the existence in stores of food enriched by adding nutritional compounds in the form of extracts/powders, the answers are divided somewhat uniformly, on a 3-point scale (agree/don't know/ disagree), respectively, 37.36% agree, 33.52% don't know, and 29.12% disagree (Table 9).

Table 9. Consumer agreement/disagreement with the existence of value-enriched foods in stores

	Men	Women	Grand Total
Agree	7.14%	30.22%	37.36%
I don't know	7.69%	25.82%	33.52%
Disagree	6.78%	22.34%	29.12%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

Approximately 70% of respondents agree that the addition of nutrients to foods resulting from the processing of fruits and vegetables in the form of extracts/powders is a solution to reduce food waste that can help protect the environment. In a percentage of about 10%, the respondents do not agree with this statement, the remaining 20% being neutral (Table 10).

Table 10. Consumer agreement /disagreement with the benefits of food enriched on the environment

	Men	Women	Grand Total
Agree	14.65%	55.13%	69.78%
I don't know	4.40%	16.30%	20.70%
Disagree	2.56%	6.96%	9.52%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

Less than half of the survey participants (44.69%) first consumed foods enriched with valuable components out of curiosity, while 22.71% expressed disagreement with the consumption of such foods (Table 11).

Table 11. Consent/disagreement of consumers with food enriched with valuable components out of curiosity

	Men	Women	Grand Total
Agree	9.89%	34.80%	44.69%
I don't know	4.95%	27.66%	32.60%
Disagree	6.78%	15.93%	22.71%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

About 69% of respondents agreed with the benefits on human health by adding nutrients resulting from the processing of fruits and vegetables to food products, and 8% of them total disagree with this statement (Table 12).

Table 12. Consumer agreement/disagreement with the benefits of food enriched in value on human health

	Men	Women	Grand Total
Agree	14.65%	54.03%	68.68%
I don't know	4.76%	18.68%	23.44%
Disagree	2.20%	5.68%	7.88%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

About three-quarters of survey participants (71.98%) agreed that minimal processing causes the least food changes (Table 13).

Table 13. Consumer agreement/disagreement with changes in minimal processed food enriched in value

	Men	Women	Grand Total
Agree	14.84%	57.14%	71.98%
I don't know	4.95%	15.20%	20.15%
Disagree	1.83%	6.04%	7.88%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

81.5% of the respondents consider that there are few information about fruit and vegetable minimal processing (Table 14).

Table 14. Consumer agreement/disagreement with the existence of information about minimal processing

	Men	Women	Grand Total
Agree	17.58%	63.92%	81.50%
I don't know	1.83%	5.86%	7.69%
Disagree	2.20%	8.61%	10.81%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

More than half of the survey participants consider that they are not sufficiently informed about the products enriched with nutritious compounds resulting from the processing of fruits and vegetables (56.41%) while 26.74% consider that they have sufficient information on this subject (Table 15).

Table 15. Consumer agreement/disagreement regarding the circulation of information on food enriched in value

	Men	Women	Grand Total
Agree	12.64%	43.77%	56.41%
I don't know	2.75%	14.10%	16.85%
Disagree	6.23%	20.51%	26.74%
Grand Total	**21.61%**	**78.39%**	**100.00%**

Source: Own calculation.

CONCLUSIONS

Analyzing the distribution of the sample according to sex, age, income, and studies, we can see that most of them are women, with higher education, aged between 29 - 59 years, with an income of over 4,500 Lei.

Respondents consume certified organic products, and when purchasing such products read the entire information on the package. When reading the information on the label, respondents mainly look at the ingredients, shelf life and origin. Also, they look for information about the manufacturer and about the ecological certification.

Among the consumed foods enriched by the addition of nutrients in the form of extracts, the respondents mentioned bakery and dairy products in the first place.

More than half of the respondents participating in the survey (61.5%) were open to purchasing an enriched food product by adding nutrients in the form of extracts from food waste.

Almost all respondents (93%) said that it is mandatory to mention on the label the use of food waste as an ingredient in other foods. To measure the preferences towards the food products enriched by value by adding nutritious compounds resulting from the processing of organic vegetables and fruits, the respondents participating in the survey expressed their agreement in majority towards the 9 statements. They agreed that minimal processing causes small changes in food, food waste contains valuable nutrients that can be used in the food industry, adding more nutrients to food products is a solution to reduce food waste that can protect the environment and should maintain the human health, there is a clear need for more information about minimal processing methods and functional food.

Foods enriched by the addition of nutrients consumed by survey respondents are mainly bakery products and dairy products that they consume several times a month.

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