HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES

Examining consumer behavior towards fresh fruits and vegetables

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1. BACKGROUND AND OBJECTIVES OF THE WORK

1.1. Importance of topic

The health-protective role of vegetables and fruits is well known and is taught to people from an early age. Yet, over the years, they seem to have forgotten the most basic resources they can use to maintain their health. The WHO has been announcing its program for nearly twenty years, with the goal of promoting vegetables and fruits to help as many people as possible take advantage of these two product lines. The WHO recommends that a person should consume a minimum of 400 grams of vegetables and fruits a day in order to avoid chronic diseases such as cardiovascular disease (WHO 2003). Despite recommendations, promotions, scientific and educational publications, the trend is not improving in many countries around the world, or even reaching a minimum. For comparison, 241 grams of vegetables and fruits were consumed in Hungary in 2014 (CSO 2019b). 290 grams in Finland (LUKE 2015), 451 grams in Spain (CERDEÑO 2015) and 347 grams in the United States (USDA 2018a). In addition to Hungary, in other European countries, Asia, as well as in the United States, the starting point of the program, it is a great challenge to persuade consumers to eat properly, one of the main ingredients of which is vegetables and fruits. The question of why people do not consume the right amount of vegetables and fruits, including personal preferences, a rushed lifestyle, the consumer's perception of taste, or the price of the product, serves as a reason. And - probably - it's more than that.

I chose this field as the topic of my doctoral dissertation because I want to get a more accurate, comprehensive picture of the fruit and vegetable consumption habits of Hungarian consumers, because I think that if we have enough knowledge about consumer behavior, we can find a way to it more easily. In my opinion, even though the consumption of fruit and vegetables by domestic consumers is still lower than recommended, this does not mean that there is no way to improve this ratio.
The problem is global and complex. Although the researchers have uncovered a number of reasons for the low consumption, the results have not improved, so further research on the topic is warranted.

Despite all these negative data, it can be said that there is a group of people interested in or living according to a healthy lifestyle in Hungary, so it does not seem hopeless that fruit and vegetable consumption will become a priority in the lives of consumers over time.

Domestic and international efforts have set themselves the goal of enabling consumers to take care of their health in the most natural way possible. Nothing proves this more than, as the UN intended, **2021 is the "International Year of Fruit and Vegetables"** (UN 2019), with a commitment and emphasis on the nutritional and health benefits of vegetables and fruits.

The main driving force of my doctoral research is to help and, where appropriate, promote good-purpose, supportive initiatives and efforts that serve people's health in the most natural way possible, with a higher level of fruit and vegetable intake.

1.2. Main objectives, and hypotheses

The structure of my dissertation and the research process are shown in the first figure. The main goal of my research is to explore the consumption of fresh fruit and vegetables and related knowledge in as wide a spectrum as possible. After the secondary research, I examine the objectives formulated in the objectives and hypotheses with primary research, for which I will apply both qualitative and quantitative methods.

The main goal of my research is to present a more comprehensive picture of the factors determining the consumption of fresh fruit and vegetables by presenting the results so far, and then also on the basis of my own research. During primary data collection I will examine the real reasons of consumption, the role of the family, the knowledge of promotions, recommendations, the relationship between domestic and imported products, and the effect of prices.

Another priority of my research is to group fruit and vegetable consumers by lifestyles using the Grunert-model. In order to understand the connections (e.g. lifestyle and consumption), I first present the closely related topics in the framework of the literature review, and then I perform my own data collection and analysis.

Another goal was to ask consumers about the branding of vegetables and fruits, what do they think; is it necessary or not?

The relationships between the objectives, the hypotheses and the research methods to be applied are summarized in the first table.

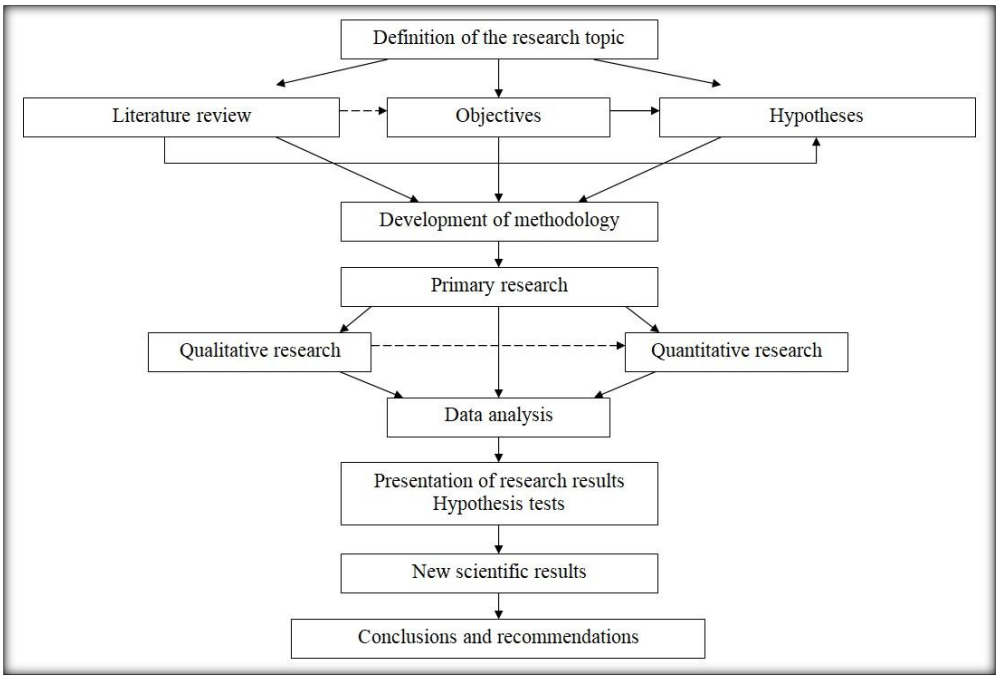

Figure 1: Research flowchart
Source: Own editing 2021.

Table 1: Relationship between objectives, hypotheses and applied methods

Objectives	Hypotheses	Applied method
O1: With the help of the literature review, I would like to explore the trends of fresh fruit and vegetable consumption in domestic and international comparison. My goal is to present the fresh fruit and fruit consumption habits - based on the studies so far - to find correlations and to answer the questions that can be answered in this way.	**H1:** *Hungarian consumers, although they mention a lot about the importance of a healthy diet, do very little to maintain their health.*	Secondary research - Literature processing and evaluation
O2: To carry out exploratory research on the reasons for consuming fresh fruit and vegetables, the role of the family, the impact of price increases, knowledge of promotions, recommendations, consumer perceptions of domestic and imported products, and opinions on branding and geographical indications. **O3:** Quantitative analysis of fruit and vegetable consumption promotions, recommendations, branding and geographical indications, as well as issues highlighted in focus group research.	**H2:** *The knowledge of fresh fruit and vegetable consumption promotions and recommendations is influenced by socio-demographic factors.* **H3:** *According to Hungarian consumers, there is no need for separate labeling of vegetables and fruits, but it is necessary to indicate well-known geographical indications.*	Primary research - Qualitative and quantitative data collection: focus group research and questionnaire research
O4: My fourth goal is to group consumers based on lifestyle and fresh fruit and vegetable consumption.	**H4:** *Fresh fruit and vegetable consumption patterns are related to lifestyle, and consumers can be grouped accordingly.* **H5:** *Consumer price sensitivity and ethnocentrism appear in distinct consumer groups in terms of fresh fruit and vegetable consumption patterns.*	Primary research - Quantitative data collection: survey

2. MATERIAL AND METHOD

Following the secondary research, I explored the issues of my dissertation in the framework of primary research. I also examined the topic with qualitative and quantitative research methods. Among the qualitative researches - individual in-depth interviews, focus group research, observation, content analysis, projective techniques, repertoire grid technique - I used focus group research for the deepest possible knowledge, while among the quantitative methods - questionnaire survey, experiment, observation - I used the questionnaire I can also obtain quantifiable data (KISS 2014, LEHOTA 2001b).

2.1. Focus group research

Focus group interviews were recruited partly among the citizens of a university in Budapest and a university in Pest County, and partly using the "snowball" method (BABBIE 2008).
Participation in the focus group research was voluntary. Interviews began in October 2019, with the last interview being held in December. When invited to the focus group interview and recruited, several people withdrew their intention to participate, but even so, they managed to conduct a group interview with 43 people. Of these, 18 were in the category of working adults (also: Adults) and 25 were students of a higher education institution (also: Students). I interviewed a total of 6 groups, adults in 3 groups and students in 3 groups.

2.2. Questionnaire research

2.2.1. PILOT research in the USA

As part of quantitative research, I conducted a questionnaire survey. The first part of this was a PILOT research I conducted at Murray State University in Kentucky, USA in the fall of 2018. The Grunert Food Related Lifestyle questionnaire, modified to the fruit and vegetable issue, was sent out to nearly 200 U.S. undergraduate students in agriculture, 38 of whom completed it. I supplemented the 69 questions with 4 demographic questions (nationality, gender, age, and major), so they had to answer a total of 73 questions. It can be said that almost all of whom started to complete the questionnaire completely from the beginning to the end, there were only 2 respondents who did not answer the last question (what major is they studying), so the main questions of the questionnaire were answered by everyone. The research lasted one month, the questionnaire was voluntary

and anonymous, and can be completed online. Due to the low number of completed questionnaires, the questionnaire was not evaluated more seriously, however, it provided an excellent basis for starting the Hungarian research, and the conclusions drawn helped in the Hungarian research.

2.2.2. Questionnaire research in Hungary

My questionnaire is a modified version of a series of 69 questions from Grunert's Food Related Lifestyle Model.

The questionnaire was disseminated in several ways; with the help of a personal circle of contacts as well as on the community media interface, but in all cases online. It has been published on the social media interface in three closed groups that can be linked to a healthy lifestyle, its members believed it is important to live a healthy life. During the selection of the groups, I placed special emphasis on the fact that it should not be a side of food supplements, "miracle cures" promoting a healthy diet / lifestyle, but closed groups made up of natural persons (people) who want / live a healthy lifestyle.

Questionnaire research began in late March 2020 and lasted until early December 2020, for more than 8 months.

I first distributed the questionnaire in a personal contact nail, in the framework of which the request reached nearly 3,000 people. A total of 199 responses were received.

On social media, the call reached a total of 56,200 members in the three closed groups. The fill rate was extremely low, contrary to my expectations for the home office. A total of 459 people filled it out by dividing it into three groups.

A total of 658 responses were received through my personal contacts as well as during posting on the social media interface. However, after data cleansing, there were 531 people left, from now on I consider them as the whole sample. I did not have the opportunity to make a representative survey of the questionnaire, so the results obtained cannot be applied to the entire Hungarian population.

The evaluation of the questionnaire was carried out with IBM SPSS version 25 statistical program and Microsoft Office 2007 Excel program.

3. RESULTS AND DISCUSSION

Based on the secondary research, my first hypothesis was confirmed.

H1 Hungarian consumers, although they mention a lot about the importance of a healthy diet, do very little to maintain their health.

Based on the results presented in the literature, it seems that although in theory health and healthy eating are important for Hungarian consumers ("health as a buzzword", "health as the main value"), its implementation and living according to it is no longer really typical for Hungarian consumers (low fruit and vegetable consumption, high proportion of those not committed to a healthy lifestyle). I wanted to prove or refute this hypothesis, as I formulated it earlier, by means of secondary research and the presentation of the literature. As a result of the literature review, I can say that **I accept the first hypothesis.**

3.1. Results of focus group research

Comparison of Students and Adults

I present a comparison of the results of the focus group interviews by comparing the two categories. I consider it important to point out possible differences of opinion, or different habits and / or similarities due to age and lifestyle. I would like to present only the most important of the demographic data, which well depicts fruit and vegetable consumption by segment. The comparison presents all the opinions of the three groups in each of the two categories, i.e. not by group, but by treating the groups together in both categories. The comparison is made on a question-by-question basis.

First, I present the gender breakdown of participants. Adults had a roughly similar proportion of women and men (10 women, 8 men), while students had male over-representation (16 men and 9 women). In terms of consumption, women were more likely to consume fruit and vegetables on a daily basis, but there were also a good number of men who consumed them every day. These data support previous findings that a healthy lifestyle is more prevalent among women.

Many similarities can be discovered between students and adults among the reasons for consuming fruit and vegetables. Love, family effect (upbringing), healthy, part of (healthy) eating, lifestyle change, healthy lifestyle, sports, and sandwich cannot be missed.

In general, regular fruit and vegetable consumption is also typical of other members of the family in both adult and student groups, but of course there were exceptions.

While all of the students believe in the beneficial effects of fruit and vegetables on the body, there has been some mistrust and sway between adults, and one person no longer believes in it.

The rise in fruit and vegetable prices is more noticed by adults than by students and also influences their decision more than by students. This can also be explained by the fact that students make a living from their free disposable income, while in many cases, adults also have to meet other needs of the family, so they need to think more carefully about their spending.

In general, two issues (seasonality and the possible lack of a one-day absence) were given less emphasis in the research. Participants generally felt that if they could, they consumed seasonal products, but also something else. And if you still don't eat vegetables and fruits one day (for those who do), it's because you're out of stock, not fresh enough to be home, and you don't want to, just miss out, or don't fit in because of the rush. After the six groups were interviewed - despite answering the questions - they do not seem to have been given a really prominent role.

Two out of 25 students and 3 out of 18 adult participants heard about fruit and vegetable consumption promotions and recommendations, and 2 people once heard about the exotic fruit and 1 festival, 1 person did not hear about the promotions, but read the recommendations afterwards. This means that 92% of students have never heard of these promotions, recommendations, and 66.6% of adults have never heard of promotions and 61% have never heard of recommendations. So 80% of all participants did not hear about fruit and vegetable consumption promotions or recommendations at all.

Regarding imports and domestic products, adults have generally stated that they cannot be so separated, they are already disappointed in both, so quality and affordability play a more important role in their purchases. It is also true for the majority of students that they consume both domestic and imported, but in this segment there is a kind of commitment to domestic products, and even to the Hungarian economy, which is helped by buying a domestic product. This kind of emotional commitment can also be important for industry marketing.

Branding was rejected by the majority of students, while the indication of the geographical indication was considered good. The same is true for adults, with the exception of 4 people, the others voted no to branding, to a separate brand name, but basically to voting for a geographical indication. Some participants further thought that the variety type or the producer should be indicated instead of the geographical indication. The formulated expectations

(geographical indication, variety type, and producer) symbolized quality and reliability among the participants.

The largest, most frequently mentioned rivals of vegetables and fruits, in the context of free association, were the following for students; chocolate, meat, cheese, hot food, while in the case of adults: cheese, meat, chocolate, soup, Hungarian food, but in this segment several people said that I would not exchange vegetables and fruits for anything else.

Overall, it can be stated that research has led to the results, the thoughts of young university students about fruit and vegetable consumption have become more deeply known, as have those of adult consumers who are already working. There are many differences from the comparison of the two generations, but there are also similarities. I found a number of issues worth exploring further despite the fact that they were not among my hypotheses. For example, the purchase of imports and domestic products, the increase in fruit and vegetable prices, and the impact of the family are also part of the questionnaire research to reflect consumer opinions on a larger sample. These results can be used in sectoral marketing as well as in subsequent research.

3.2. Results of questionnaire research

3.2.1. Knowledge of fruit and vegetable consumption promotions and recommendations

Slightly more than half of the 531 respondents (56%) had not yet heard about the programs promoting fruit and vegetable consumption.

Knowledge of fruit and vegetable consumption promotions is influenced by consumers 'gender (χ^2=4.498; df=1; p=0.034), age (χ^2=34.363; df=5; p=0.000), position (χ^2=26.363; df=4; p=0.000) and education (χ^2=12.175; df=4; p=0.016). There is no significant correlation between the knowledge of fruit and vegetable consumption promotions and the income of consumers (χ^2=9.902; df=8; p=0.272).

Fruit and vegetable consumption promotions were examined by 60.5% of men and 42.8% of women, based on the gender of the respondents.

Based on age, 83.3% of those aged 18-24 had not heard of consumer promotions. The best rate is for those aged 60-65, with 62.7% having heard of consumer promotions. 33.3% of 25-35 year olds, 35.6% of 36-44 year olds, 54.0% of 45-59 year olds, 37.5% of over 65 age group know consumer promotions.

Based on the position, it can be said that the knowledge of fruit and vegetable consumption promotions was the lowest among university / college students, only 15.2% of them knew it. The best rate was observed

among business owners, with 65.9% having heard of the promotions. 40.4% of employees, 55.0% of executives and 54.1% of inactive / retired respondents have heard of promotions.

In terms of educational attainment, the indicator was also the worst in terms of proportions of students with a high school diploma but undergraduate degree; only 16.7% had heard of the promotions. Of all respondents, 4 indicated primary education as the highest level of education, two of whom heard, two did not hear about the promotions. 41.9% of secondary / high school graduates are familiar with the promotions. 49.1% of university / college graduates, while 5 out of 7 PhD, so 71.4% have heard of consumer promotions. Based on this, it can be seen how significantly education has an impact on the knowledge of fruit and vegetable consumption promotions.

The WHO recommendation that a minimum of 400 grams of vegetables and fruits be consumed daily in order to avoid major chronic diseases such as cardiovascular disease is known to 68.7% of respondents.

Knowledge of the WHO fruit and vegetable consumption recommendation is influenced by the age (χ^2=46.654; df=5; p=0.000) and position (χ^2=17.812; df=4; p=0.001). There was no significant relationship between consumers' gender (χ^2=0.002; df=1; p=0.965), education (χ^2=5.625; df=4; p=0.229), and income (χ^2=6.407; df=8; p=0.602).

Analyzing the WHO recommendation, based on age, only 30% of respondents aged 18-24 were aware, 70% were not. With this result, they show the greatest "lack of knowledge" within the age distribution, which suggests that consumption recommendations should be better communicated to them. In terms of proportions, people aged 60-65 have the highest level of knowledge of the recommendations, with 84.7% of this age group having already heard of the WHO recommendation. For other age groups, the language of balance is more positive; 57.4% of 25-35 year olds, 61.5% of 36-44 year olds, 78.2% of 45-59 year olds, 78.6% of 65+ age group know it, have heard of the recommendation.

Analyzing the knowledge of the WHO recommendation by grade, it can be said that in terms of proportions it was the lowest among university / college students compared to other grade categories, as 48.5% of them heard about it and 51.5% did not. This is related to age. The largest proportion of respondents who are no longer active / retired are familiar with the recommendations, as 83.5% know them and only 16.5% do not. In this case, too, a correlation can be found in terms of age and position, as the 60+ age group was most characterized by knowledge of the recommendations. 66.3% of employees, 65.0% of executives and 78.0% of business owners said they had heard of the WHO recommendation.

H2 The knowledge of fresh fruit and vegetable consumption promotions and recommendations is influenced by socio-demographic factors.

During the cross-tabulation analysis following the quantitative data collection, it can be stated that the knowledge of fresh fruit and vegetable consumption promotions and recommendations is influenced by socio-demographic factors. Consumer promotions are significantly related in terms of consumers' gender, age, education, and position, while recommendations can be characterized by consumers' age and position. Accordingly**, I accept the second hypothesis.**

3.2.2. Branding of fruit and vegetables, indication of geographical indications

Regarding the issue of branding, which often arises in professional circles, in the questionnaire I also asked the respondents to give their opinion on the branding of vegetables and fruits and the need to indicate the geographical indication.

The labeling of vegetables and fruits was rejected by 66.9% of the respondents, according to them they do not need to be branded, but 33.1% consider it necessary.

From the answers of the respondents it can be concluded that it is not necessary to label vegetables and fruits separately, however, the indication of the geographical indication was considered important by more than ¾ of the respondents. The main reasons for the indication of the geographical indication: quality, reliability, trust, guarantee, and signs of ethnocentrism also appeared.

H3 According to Hungarian consumers, there is no need for separate labeling of vegetables and fruits, but it is necessary to indicate well-known geographical indications.

After the qualitative research, I also examined the third hypothesis with quantitative research. According to the results of the questionnaire survey, 67% of the respondents said that vegetables and fruits should not be branded, while the indication of the geographical indication was considered important by two thirds of the respondents. For the respondents, the geographical indication meant reliability, quality, and guarantee. In terms of results, **I accept the third hypothesis.**

3.2.3. Results of principal component analysis

During the examination of the questionnaire, I first performed principal component analysis. The value of the Kaiser-Meyer-Olkin (KMO) index was 0.797, and according to the significance level detected by the Bartlett test (χ^2=10299.562; df=1081; p=0.000), the variables correlated with each other, so both tests showed that the variables were suitable for principal component analysis. In the correlation part of the Anti-image matrix, the values in the main diagonal were close to 1, typically ranging from 0.7 to 0.9, with no MSA value (0.5 or less) that should have been excluded. During the principal component analysis I used Varimax rotation (SAJTOS - MITEV 2007).

As a result of the principal component analysis, 13 principal components were created, the variance of which was 65.47%, which value reaches the minimum level of 60% expected in the social sciences (SAJTOS - MITEV 2007), while according to other research 50% is expected (SZÉKELYI - BARNA 2008). After the 13 principal components, the eigenvalues of the variables were already below 1. For the principal component weight value, I first left it at 0.1 and then raised it to 0.4 to keep only variables with a minimum principal component weight of 0.4 or above. Applying the elbow rule could have reduced the number of principal components to 7 principal components, but the analysis conducted in this way did not fit this model. I ran it using the Maximum-likelihood method for 5, 6, and 7 principal components, but based on the significance level in the Goodness-of-fit Test table, none of the models fit well with the data.

I also performed the principal component analysis by the a priori criterion, since the questionnaire used is a standardized questionnaire with which consumers can be grouped. Recent research has applied the Grunert questionnaire for other topics accordingly (BARNA et al. 2020). The five components have already been presented earlier in the literature section, so they are only listed here; (1) purchasing motives, (2) ways of shopping, (3) quality aspects, (4) ways of cooking, (5) consumption situations. According to this, based on the 5 components, I ran the principal component test again, but the variance ratio fell short of the expected 50-60%. Based on these results, I stayed with the 13 principal component solutions, as SZAKÁLY et al. (2013) used principal component analysis earlier.

The resulting 13 principal components are as follows:

- Quality aspects,
- Product awareness, naturalness,
- Love of cooking,
- Price awareness,
- Search for novelty,
- The importance of the family,
- Planning,
- Social relationships, friends,
- Freshness,
- Obtaining information,
- Out-of-home meals,
- Snacking,
- „Who's the chef?"

Although I did not choose the a priori criterion for the reasons listed, I present [Fig. 2] how the 13 main components are related to the 5 components of the Grunert model (purchasing motives, ways of shopping, quality aspects, ways of cooking, consumption situations).

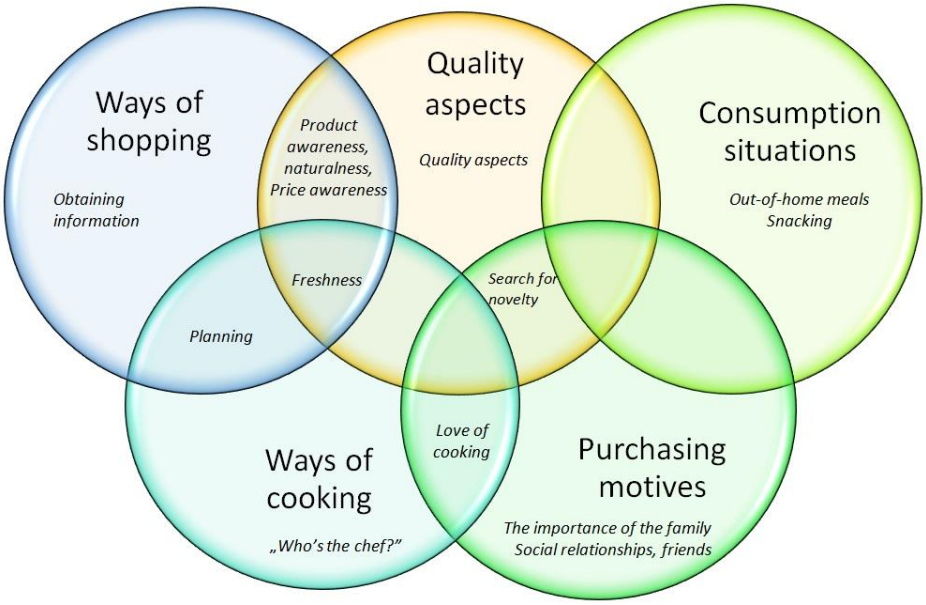

Figure 2: The relationship between the 5 components of the Grunert model and the 13 principal components
Source: Own research 2020.

After designing the 13 principal components, I examined the reliability of the latent dimensions. Latent dimensions with too low and / or negative Cronbach's alpha values were not used in my further research (cluster analysis). Accordingly, I performed the cluster analysis with the following main components: Product awareness, naturalness; Love of cooking; Price awareness; The importance of the family; Planning; Social relationships, friends; Obtaining information; Out-of-home meals; Snacking.

3.2.4. Results of cluster analysis

Following the principal component analysis, I used cluster analysis to be able to divide consumers into groups based on their lifestyles and fruit and vegetable consumption. I performed the cluster analysis based on the 9 latent dimensions of the principal component analysis, as I was able to verify the measurement reliability of these. The 9 main components are: *product awareness, naturalness; love of cooking; price awareness; the importance of the family; planning; social relationships, friends; obtaining information; out-of-home meals; snacking.*
I performed the cluster analysis with the K-means method (CSALLNER 2015, KETSKEMÉTY et al. 2011, SZÉKELYI - BARNA 2008), and I also ran it for 3, 4, 5 clusters, and finally I accepted the 4 cluster solution. The names and numbers of the clusters, their ratio to each other and to the total sample are summarized in Table 2. The clusters were named based on their main properties.

Table 2: Name and distribution of the four clusters

Names of clusters	Item number (capita)	Distribution (%)
Product-conscious	162	30,5
Informed	157	29,6
Busy	89	16,7
Uninvolved	123	23,2
Total	531	100

Source: Own research 2020.

Examining the correlation between demographic data and clusters in a cross-tabulation, the gender of the respondents did not result in a significant relationship (χ^2=1.557; df=3; p=0.669).
Respondents' age (χ^2=45.047; df=15; p=0.000), position (χ^2=41.419; df=12; p=0.000), education (χ^2=28.188; df=12; p=0.005), and income (χ^2=47.848; df=24; p=0.003) showed a significant relationship, so the clusters were also characterized on the basis of these demographic factors. These factors will

always be presented relative to the overall sample per cluster in order to make the differences even more visible.
There was also a significant relationship between the fruit and vegetable consumption promotions (χ^2=10.414; df=3; p=0.015) and recommendations (χ^2=17.272; df=3; p=0.001), and the 4 clusters, therefore the knowledge of the promotions and recommendations is also presented by clusters.

Figure 3 illustrates the main characteristics of the clusters and their relationship to each other.

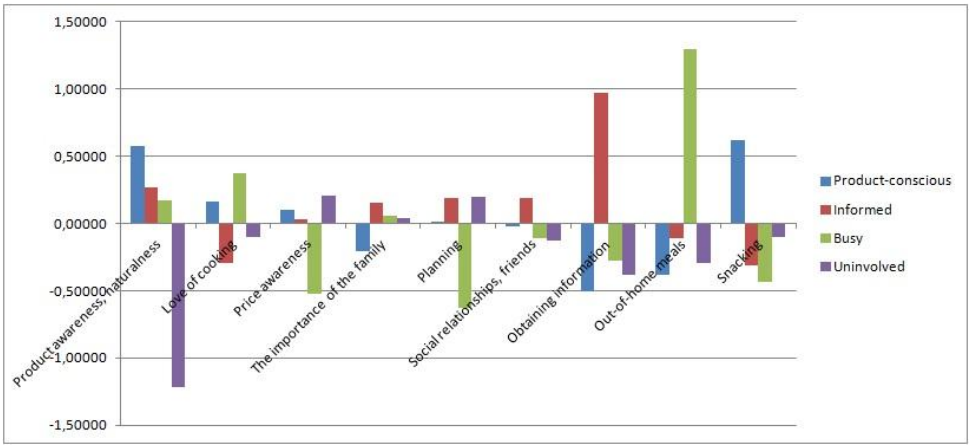

Figure 3: Characteristics of clusters
Source: Own research 2020.

I begin the analysis with the **Product-conscious** group. The cluster included 162 people, which was one third of the examined sample. They got their name because of the 4 clusters, they are most characterized by product awareness and naturalness.
It can be said that they like to cook, they are price-conscious, and they plan shopping and cooking in advance, however, these criteria appeared with a relatively low but positive sign value. In contrast, the importance of family and company is less characteristic of them. There was also less agreement with the claims of eating out and getting information from advertisements, and the group is not characterized by these criteria either. It can be said that of the 4 clusters, snacking is the most characteristic of them.
Knowledge of fruit and vegetable consumption promotions was typical of 44% of all respondents, while knowledge of promotions was typical of 69% of them. Of those respondents who are familiar with promotions, 31.6% belong to the Product-conscious group, while 32.9% are familiar with the recommendation.

Based on the demographic data, I can conclude that the Product-conscious are more middle-aged, older respondents with a very high level of education. In terms of income, they are partly exceptionally high and partly above average, according to their positions mainly employees, business owners, and retirees.

The second group was named **Informed**, as out of the 4 clusters, they are the ones most prominent in obtaining information. In addition, it can be said that product awareness, naturalness, planning, family and friends, as well as price awareness are important traits with a positive sign but low value. However, they do not like to cook, they are not characterized by out-of-home meals, nor is snacking.

The proportion of those who know about fruit and vegetable consumption promotions and recommendations in this group is similar to that of those who are product-conscious. 32.9% of those familiar with promotions and 31.8% of those familiar with the recommendation belong to this segment.

Based on the demographic data, it can be said that the Informed group is very similar to the Product-conscious group, but it is a slightly younger segment with a slightly lower education and position, which cannot be differentiated according to income categories.

I named the third group **Busy** because they are the only one of the 4 clusters to have an outstanding out-of-home meal. In addition, the love of cooking also appears, as does the importance of product awareness, naturalness, and, with very low value, family. However, they are not price-conscious, do not plan, and getting information and spending time with friends is not very important to them either. They are the ones who most refuse to snack.

Only 18.8% of those familiar with fruit and vegetable consumption promotions were included in this group, while 17.3% of those familiar with the recommendation. It seems that the Busy have little time for this kind of orientation as well.

Assessing the demographic data as a whole, it can be said that it is an exceptionally high-income, senior or business owner stratum. However, the group is clearly not demarcated on the basis of age and education.

The fourth group is the **Uninvolved** group. They got their name because they agreed with only three of the nine latent dimensions; with price awareness, the importance of family, and planning, but these don’t show up with outstanding value either. On the other hand, they are the ones who are not characterized by product awareness or naturalness at all. They don't really like to cook, they are less important to their friends, the company, the snacking is not typical for them, nor is the out-of-home meals, nor is it about getting information.

Those familiar with fruit and vegetable consumption promotions appeared in the lowest proportion, in this segment, with 16.7%, while those familiar with the recommendation had the second lowest proportion, 18.1%, after Busy. Uninvolved people don't seem to be particularly interested in promotions or recommendations, they don't get this information.

Demographic data show that this segment is a group of younger, partly university students, as well as a high proportion of employees. Due to the former, the proportion of high school graduates is high.
This is also reflected in terms of incomes, with above-average or below-average income levels characterizing this group.

Based on the presentation of the 4 clusters, it can be seen that the groups are sufficiently separated from each other on the basis of demographics and lifestyle characteristics, each cluster has its own main characteristics.
In connection with the applied model, it should be mentioned that in Hungary the individual groups and their characteristics have not yet solidified as much as in the Western European countries. It has not yet been embedded in Hungary, and the characteristics of all clusters have not been clarified. Lifestyle elements have only a weak effect on fruit and vegetable consumption, but can already be examined.

H4 Fresh fruit and vegetable consumption patterns are related to lifestyle, and consumers can be grouped accordingly.

I conducted my research with a modified questionnaire on the topic of vegetables and fruits in Grunert's Food Related Lifestyle Model. Two-thirds of respondents are interested in or live a healthy lifestyle. The collected data were analyzed by principal component and cluster analysis, and I was able to separate 4 separate groups. The 4 lifestyle groups are as follows; "Product-conscious" (30.5%), "Informed" (29.6%), "Busy" (16.7%), "Uninvolved" (23.2%). Although the sample is not representative, it cannot be extended to the whole population, only to the consumer segment studied, but with this modification, **I accept the fourth hypothesis.**

As price awareness appeared with low values in the groups created by the cluster analysis, I further investigated whether price sensitivity would be more characteristic of consumer segments. However, in the cross-tabulation analysis, no significant relationship could be detected between price sensitivity and the 4 clusters (χ^2=20.464; df=12; p=0.059). Based on these, it seems that not price sensitivity, but indeed price awareness is characteristic of the clusters, where the sign of the criterion was positive.

Using further cross-tabulation analysis, I examined whether ethnocentrism appears in the 4 clusters. The literature section shows that ethnocentrism is also characteristic of Hungarian consumers. Regarding fruit and vegetables, it can be said that Hungarian consumers really like domestic vegetables and fruits, the most purchased domestic product is vegetables and fruits, and according to some research they are willing to pay more for domestic, trademarked products, although this is considered to be true only on a theoretical level by other research.

Based on my primary exploratory research, it could be concluded that the domestic product is still attractive to consumers, and the questionnaire research also confirmed that the respondents prefer Hungarian vegetables and fruits, and if domestic fruit and vegetables are available, they buy them.
For these reasons, I examined how ethnocentrism can appear in lifestyle clusters. However, unfortunately, the cross-tabulation analysis did not show a significant relationship between ethnocentrism and the 4 clusters. (χ^2=10.806; df=6; p=0.095).

H5 Consumer price sensitivity and ethnocentrism appear in distinct consumer groups in terms of fresh fruit and vegetable consumption patterns.

I examined the relationship between consumer groups and price sensitivity as well as ethnocentrism by cross-tabulation analysis. No significant relationship could be detected between consumer groups and price sensitivity and ethnocentrism. Based on this, **I reject the fifth hypothesis.**

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Hypothesis tests

During the presentation of the results, the hypotheses were tested. The objectives, the related hypotheses and their justification are summarized in Table 3.

Table 3: Hypotheses and their results

Objectives	Hypotheses	Testing hypotheses
O1: With the help of the literature review, I would like to explore the trends of fresh fruit and vegetable consumption in domestic and international comparison. My goal is to present the fresh fruit and fruit consumption habits - based on the studies so far - to find correlations and to answer the questions that can be answered in this way.	**H1:** *Hungarian consumers, although they mention a lot about the importance of a healthy diet, do very little to maintain their health.*	**ACCEPTED**
O2: To carry out exploratory research on the reasons for consuming fresh fruit and vegetables, the role of the family, the impact of price increases, knowledge of promotions, recommendations, consumer perceptions of domestic and imported products, and opinions on branding and geographical indications.	**H2:** *The knowledge of fresh fruit and vegetable consumption promotions and recommendations is influenced by socio-demographic factors.*	**ACCEPTED**
O3: Quantitative analysis of fruit and vegetable consumption promotions, recommendations, branding and geographical indications, as well as issues highlighted in focus group research.	**H3:** *According to Hungarian consumers, there is no need for separate labeling of vegetables and fruits, but it is necessary to indicate well-known geographical indications.*	**ACCEPTED**
O4: My fourth goal is to group consumers based on lifestyle and fresh fruit and vegetable consumption.	**H4:** *Fresh fruit and vegetable consumption patterns are related to lifestyle, and consumers can be grouped accordingly.*	**ACCEPTED**
	H5: *Consumer price sensitivity and ethnocentrism appear in distinct consumer groups in terms of fresh fruit and vegetable consumption patterns.*	**REJECTED**

Source: Own research 2020.

4.2. Conclusions

A number of new results were obtained during the research, as well as previous knowledge was confirmed. It can be shown that consumers are influenced by economic-income relations (prices), social factors (lifestyle groups), demographic characteristics (different age groups and their habits), psychological factors (love vegetables and fruits), and personal preferences (fruit and vegetables and 'competitors') are all affected.

The preference for domestic products, which was also confirmed during the questionnaire, carries signs of ethnocentrism. The importance of indicating a geographical indication (as "branding") emphasizes the benefits of branding; commitment, loyalty, strong associations to quality, reliability. This is a relevant value for Hungarian agriculture.

In the course of the dissertation, the income and education of consumers have been emphasized several times in the literature, which has a positive effect on the shift towards a healthy lifestyle. In my primary research, it can also be concluded that income and education matter. In the focus group research, the free disposable income of the Students was also high, and the net monthly earnings of the Adults were also at least average or above. In terms of their education, they have at least a secondary education, but most of them have a secondary education, but have the status of a university student, or have already had a higher education. The questionnaire also showed that almost all those interested in the topic had at least a secondary or tertiary education, as primary school education accounted for only 0.8%. In terms of monthly net income, more than half of the respondents had at least HUF 200,000, which also supports the need for a higher income for a healthy lifestyle.

The fact that more than 90% of the respondents in the questionnaire research are women supports the previous results that women are more interested in a healthy lifestyle and thus in fruit and vegetable consumption. However, in the focus group research, a high proportion of male participants are reassuring that, either because of family or individual interest, they also keep in mind the importance of regular fruit and vegetable consumption.

In the focus group research, the emotional attachment on the part of the participants should be highlighted, according to which 1/3 of them consume vegetables and fruits because they like it and this is the main reason. This psychological factor is one of the most important in connection with the

purchase of a product, therefore it would be necessary to strengthen it and spread it more widely.

Fruit and vegetable prices have risen dramatically an in recent year, which is felt by consumers, and this fact is also affecting their purchases. It is difficult to comply with the recommendations if consumers cannot pay for vegetables and fruits. Yet the current pandemic just underlines how important it is to be healthy.

It can be stated that the awareness of fruit and vegetable promotions and recommendations is not very high even in such a circle, most of who are interested in a healthy lifestyle, which raises the question of how popular these programs have become among the non-engaged.

In connection with the fruit and vegetable consumption promotions and recommendations, we can also see that with the increase of age, the proportion of those who know the promotions and recommendations increases. Knowledge of promotions and recommendations is lowest in the 18-24 age group, and highest in the 60+ age group. With regard to education, it can also be seen that among those with higher education, they are more familiar with fruit and vegetable consumption recommendations and promotions. Here, too, it was the least common for university students (typically between the ages of 18 and 24) to be familiar with recommendations and promotions.
It is important and worth highlighting this because professional organizations invest a lot of strength, energy and money in the educational programs of children and adolescents. But it seems that the young adult layer growing up in this way has not yet been sufficiently addressed, or with sufficient effectiveness.
However, it can be seen that the level of awareness also increases with advancing age and higher education.

Research by Grunert's Food Related Lifestyle Model shows that lifestyle elements are already emerging in the context of fresh fruit and vegetable consumption patterns. The sample is not representative, so it cannot be projected on the entire population of Hungary, but it would be worthwhile to perform it on a representative sample later. Of course, the question arises as to how long it will take for lifestyle groups to be detectable in a representative sample in terms of fruit and vegetable consumption, as these lifestyle elements have not yet solidified in our country.

In my research, the fourth lifestyle group, the Uninvolved, showed a high proportion of 18-24 year olds and - based on their position - college students. Those familiar with fruit and vegetable consumption promotions were in the lowest proportion here, while those familiar with the recommendation had the second lowest proportion after Busy.
The cross-tabulation analysis carried out before the cluster analysis also showed that this age group is the least familiar with the promotions and recommendations.
The focus group exploratory research also yielded a similar result, as only 2 of the 25 university students interviewed heard about the promotions and recommendations.
These data are very consistent, from which it can be concluded that this age group has not yet been sufficiently or effectively achieved.

4.3. Recommendations

Examining the conclusions and the dissertation as a whole, many thoughts and suggestions were born in me. I believe that although the sample is not representative, so the results are not applicable to society as a whole, they are nevertheless thought-provoking in many respects. It is very telling that the 18-24 age group surveyed is under-informed in terms of promotions and recommendations. It is questionable whether, in addition to children and adolescents, this young adult age group should not be targeted by some kind of promotional program. In my opinion, it would be worthwhile to examine the awareness of consumer promotions and recommendations in a representative sample, so that we can see what proportions come out there, as it would be very important to get this information to as many people as possible. Hungarian agriculture needs it as well as Hungarian consumers. I would focus on that first.

The fact that geographical indications are important to consumers certainly provides a good basis for decision-makers to rethink; do you really need a new, unknown brand, or should you just refill the old, well-known, well-established geographical indications?! Although I did not examine this in the primary research, it is clear from the literature that trademarks also mean quality and reliability for consumers, so in addition to geographical indication, this also has a positive effect on purchasing decisions. If the preference for Hungarian products is combined with the conscious use of geographical indications, the domestic (agricultural) economy and Hungarian consumers will also benefit. As the questionnaire research has shown, geographical indications still have value, they still mean reliability, guarantee and quality for consumers. In my opinion, it would be necessary to further strengthen this line.

I think the main priority should be to develop emotional attachment as widely as possible, which is probably one of the most difficult tasks. Focus group exploratory research has shown that for many consumers, this is the main reason for consuming fruit and vegetables on a regular basis. Undoubtedly, it will take a long time to strengthen this among consumers and a comprehensive marketing strategy is needed, but it is one of the main drivers of the transition to a healthier lifestyle.

In the consumer lifestyle groups created using Grunert's Food Related Lifestyle Model, a high proportion of 18-24 year olds and university students also appear in the Uninvolved segment. Although the sample is not

representative, it is repeatedly confirmed that this age group has not been adequately addressed.
It would be worthwhile to examine this age group specifically with other means, what is the reason for the lack of knowledge. I believe that querying Gunert's Food Related Lifestyle Model on a representative sample would yield further useful and interesting results that would not only serve science but also get to know the population through fruit and vegetable consumption, grouping it further to help understand the main aspects of commitment, or reasons for its absence.

All these future research opportunities would serve science, Hungarian agriculture and thus the Hungarian economy as well as Hungarian consumers.
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5. NEW SCIENTIFIC RESULTS

Based on the primary research of the doctoral dissertation (focus group research, questionnaire research), I obtained the new scientific results formulated below. The results were formulated on the basis of the results of quantitative research, even if I researched the issue to be examined both qualitatively and quantitatively, taking into account the specifics of the research and the conclusions that can be drawn from them.

1. **Knowledge of fruit and vegetable consumption promotions and recommendations is influenced by socio-demographic factors.**

   I also examined the awareness of fruit and vegetable consumption promotions and recommendations using both qualitative and quantitative methods. 56% of the participants in the questionnaire research (n=531) do not know the promotions, 44% do, do not know the recommendations, 31% do not know, 69% do. Following the cross-tabulation analysis, it can be said that the knowledge of fruit and vegetable consumption promotions is influenced by the respondents' gender, age, education and position. Knowledge of fruit and vegetable consumption recommendations is influenced by respondents' age and education.

2. **There is no need for separate branding of vegetables and fruits, but it is necessary to indicate the geographical indication, as the geographical indication means quality, reliability and a guarantee.**

   I also examined the branding of vegetables and fruits and the relevance of the indication of the geographical indication using both qualitative and quantitative methods. 67% of the respondents to the questionnaire survey (n=531) said that vegetables and fruits should not be branded, but two thirds of the respondents considered the indication of a geographical indication important. Respondents see quality, guarantee and reliability in the geographical indication.

3. **There is a correlation between fresh fruit and vegetable consumption habits and Grunert's lifestyle elements, and consumers can be grouped accordingly.**

   The consumers included in the study were grouped according to their lifestyle with the questionnaire adapted to the topic of vegetables and fruits in Grunert's Food Related Lifestyle Model (n=531). After the cluster analysis, based on the results, I was able to distinguish 4 distinct groups, which are: "Product-conscious" (30.5%), "Informed" (29.6%), "Busy" (16.7%), "Uninvolved" (23.2%). In terms of demographic factors, clusters can be characterized by the age, education, position and income of the respondents.

4. **Consumer price sensitivity and ethnocentrism do not appear in distinct lifestyle groups.**

   For the 4 consumer segments obtained after the cluster analysis, I examined how consumer price sensitivity and ethnocentrism appear in the groups by cross-tabulation analysis. However, the results of the study showed no significant relationship with lifestyle clusters in terms of either consumer price sensitivity or ethnocentrism.

6. PUBLICATIONS

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On a foreign language:

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