

Article

Consumers' Behavior in the Field of Organic Agriculture and Food Products during the COVID-19 Pandemic in the Czech Republic: Focus on a Comparison of Hyper-, Super- and Farmers' Markets and Direct Purchases from Producers

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Abstract: The aim of this paper is to assess Czech food consumers' behavior when buying organic products during the COVID-19 pandemic, with an emphasis on the place of purchase of organic agriculture and food products—especially those purchases with the shortest logistics value chain, i.e., purchase at farmers' markets, or directly from the producer—and a comparison with the current most common places of purchase of organic products in the Czech Republic, supermarkets and hypermarkets. Categorical data analysis methods were used to create a profile of the consumer according to the most frequent purchase locations. To create mathematical–statistical models and interpretations, the methods of logistic regression, correspondence analysis and contingency table analysis were chosen. According to the results of the survey, respondents under 25 years of age are the least likely to make purchases at farmers' markets or directly from the producer. Consumers aged 26–35 and with a university degree are the most likely to buy organic agriculture and food products at this location, followed closely by older respondents in the categories 36–45 and 46+ and with a secondary education. It is important for manufacturers to have an overview of where, in what quantities, and for what reasons consumers buy their products, especially for reasons of production optimization and planning, ecological concerns, rural development, and the impact on local areas and the value chain.

Keywords: food customers' behavior; organic agriculture and food products; organic farming; agricultural value chain; sustainable logistics chain; sustainable development of rural areas; hyper- and supermarkets; farmer's markets; direct purchase from producers



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1. Introduction

Environmentally friendly organic products are growing in popularity among consumers, as a result of trends towards a healthy lifestyle and the protection of the environment. The authors of [1] have mentioned this change in consumers' behavior. Consumers were concerned about the impact of environmental damage on their health and safety. Their concerns have led marketers to incorporate environmental problems into their decision-making. Two other important attitudes, i.e., trust in food and health consciousness, have emerged as major reasons for consumers' attraction to organic food.

Although organic farming is still a relatively small sector, the demand for organic agriculture and food products is growing worldwide. Equally, as awareness of environmental issues [2,3], green world [4–6], and naturopathy [7] increases, marketers want to sell these products more.

Potential customers buying organic product are likely to be people who believe in their benefits for health and environmental protection [8–13]. There is a direct link between

socio-demographic variables and nutritional knowledge and attitudes towards healthy eating, as well as sustainable eating behaviour [8,9]. Households that perceive organic agriculture and food products as healthier are also more likely to buy organic products and are willing to pay more for them than other households [14]. Organic agriculture and food products are often produced in a healthier and more environmentally friendly manner [15]. Organic production are products that are subjectively environmentally friendly, produced using environmentally friendly methods [16]. According to [17], the choice of organic versus non-organic food is strongly influenced by the perceived health effect of organic agriculture and food products. Households that perceive organic agriculture and food products as subjectively healthier are more likely to buy organic products and have a higher willingness to pay more for them than other households [18]. Organic agriculture and food products are also perceived as subjectively healthier and safer, and organic practices are perceived as more environmentally friendly, according to one study [19].

The results of the study reported in [20] show that consumer confidence and beliefs about organic agriculture and food products vary across European countries. In particular, consumers had a high level of trust in certified organic agriculture and food products chains and their products. They rely on certification authorities, a finding which is confirmed by the findings of other authors (e.g., [21]).

Many factors influence the purchase of organic agriculture and food products, among which are socio-demographic characteristics such as age, gender, education, and household income. The authors of the study reported in [22], who examined the US market, concluded that gender does not influence the purchase of organic agriculture and food products. Consumers more likely to purchase organic agriculture and food products are described as older, lower income, and religious. Women who are interested in these products are more highly educated. In the German market [23], it is confirmed that women who buy organic agriculture and food products are both more educated and more middle-aged. Based on study [24], young men and women, regardless of age, consider organic agriculture and food products more important and include it in their purchases.

As already mentioned, income is another factor that influences the purchase of organic agriculture and food products. Households with higher incomes are more likely to buy these products. On the other hand, people with lower incomes buy organic food less often.

The frequency of organic agriculture and food product purchases in relation to age and gender has also been confirmed by Chinese and Polish studies [25,26]. In Bangladesh [27], age, education and household income also emerged as significant factors. On the other hand, gender and marital status had no effect on the purchase of organic agriculture and food products. According to [28], socio-demographic characteristics have no association with willingness to purchase organic agriculture and food products.

The place where customers buy these organic agriculture and food products is also an important factor [29,30]. Traditional brick-and-mortar stores still dominate as the main purchasing channel. Furthermore, at this point they are being revitalized considerably, offering new services and also expanding into acting as pick-up places [31–33]. However, customers also want to support small (e.g., regional) entrepreneurs and buy unique products, e.g., organic ones [34].

According to [35], the typical organic agriculture and food products consumer is a middle-aged, middle-class, university-educated woman living in a large municipality who shops in supermarkets and prefers to eat vegetables, fruit and eggs. The study reported in [36] shows how organic agriculture and food products is mainly purchased in specialty stores and supermarkets for personal satisfaction, health, safety, conservation of natural resources, and environmental protection. Respondents of the study reported in [37] prefer to buy organic agriculture and food products directly from producers, followed by supermarkets and specialty stores.

More and more attention is being paid to the topic of organic agriculture and food products all over the world, but there is a lack of in-depth research in the Czech Republic. The aim of this paper is therefore to assess the purchasing habits of Czech consumers when

buying organic agriculture and food products, with an emphasis on the place of purchase of organic agriculture and food products, especially the purchase with the shortest logistics chain, i.e., purchase at farmers' markets, or directly from the producer, and a comparison with the most common places of purchase of organic agriculture and food products in the Czech Republic, i.e., supermarkets and hypermarkets. It is important for manufacturers to have an overview of where, in what quantities, and for what reasons consumers buy their products, especially for reasons of production optimization and planning, ecological concerns, rural development and the impact on local areas and on the value chain.

2. Materials and Methods

Primary data were obtained from a questionnaire survey conducted between September 2020 and December 2020 during the COVID-19 pandemic. In the survey, data from 757 respondents from the Czech Republic were collected. It is a completely unique data set collected during the COVID-19 pandemic, which seeks to analyse the purchasing habits of respondents when buying organic agriculture and food products. The gender structure of the respondents is shown in Table 1, and the education of the respondents is shown in Table 2.

Table 1. Contingency table–Gender.

Gender:	Relative Frequencies
Women	65.13%
Men	34.87%

Source: (Authors' calculations).

Table 2. Contingency table–Education.

Education:	Relative Frequencies
Primary	7.27%
Secondary	70.15%
Tertiary	22.59%

Source: (Authors' calculations).

For the binary explanatory variable (Does your household purchase organic agriculture and food products?), we were interested in factors that have a significant effect on whether respondents do not purchase (coded as 0) or purchase (coded as 1) organic products. The explanatory variables of gender, age and education were considered as categorical variables, and the values of the variables were coded with an increasing ordinal scale of 1, 2, 3 . . . corresponding to the increasing value of the variable. The nominal variable gender was scaled with values of 0 (female) and 1 (male).

The main research question is where and how often consumers bought organic food during the COVID-19 pandemic. A research-sub question was how the socio-demographic characteristics of consumers (gender, age, education) influenced their preference of where to buy organic food. The research focused primarily on the frequency of organic agriculture and food purchases in the following places: hypermarket (e.g., Kaufland, Albert hypermarket, Tesco, etc.); supermarket (e.g., Billa, Albert supermarket, etc.); and markets and farmers' markets. The question was in the form of a Likert scale capturing the frequency of purchases with answers, i.e., several times a week, 1 time a week, 1 time in 14 days, less often, or not at all. The identification questions included gender, age, and education of the respondents.

The data analysed were categorical or suitable for categorization. Logistic regression and contingency table analysis including Pearson's chi-squared test [38,39] were used to process the data. The obtained relationships were presented in graphical form using correspondence analysis, similarly as [40–42]

When the explanatory variable is dichotomous with two values, 1 and 0, which mean whether the phenomenon A has occurred or not, binary logistic regression is used. The

parameters of the regression model are estimated using the maximum likelihood method. Wald statistics are used to test the significance of the regression coefficients. The quality of the model is assessed, for example, by chi-square goodness-of-fit test [43].

Correspondence analysis is a popular graphical technique used to analyse the relationships between categories of one or more variables in contingency tables. Using the tools of correspondence analysis, it is possible to describe the associations of nominal or ordinal variables and to obtain a graphical representation of the relationships in a multidimensional space. Beh [44] sees the greatest advantage of this method in its ability to graphically represent the interconnectedness of categories. Hebák et al. [45] add that correspondence analysis shows the correspondences of categories of each variable and provides a common picture of row and column categories in the same dimensions. Unlike most other multivariate methods, correspondence analysis allows for the treatment of categorical non-metric data and non-linear relationships [46]. The calculations were performed with the help of the STATISTICA 13, UNISTAT 5.1 software.

3. Results

The parameter estimates of the resulting regression model, including the values of Wald statistic, the significance of each coefficient, and the 95% confidence interval, are presented in Table 3, where the statistically significant dependence of purchasing organic products on education is evident. A positive regression coefficient means that respondents with higher education are more likely to purchase organic products. The other relationships are not statistically significant, but the sign of the regression coefficients suggests that women purchase organic agriculture and food products slightly more often than men and that the frequency of such purchases increases slightly with age. In order to examine these trends in more detail, which may not always be linear, contingency tables of partial dependencies were further developed.

Table 3. Regression Model Parameters.

	Coefficient	Standard Error	Wald Statistics	Significance	Lower 95%	Upper 95%
Constant	0.4127	0.2421	2.9053	0.0883	−0.0619	0.8872
Gender	−0.1351	0.1180	1.3105	0.2523	−0.3663	0.0962
Age	0.0263	0.0535	0.2410	0.6235	−0.0786	0.1312
Education	0.5226	0.1078	23.4955	0.0000	0.3113	0.7340

Source: (Authors' calculations).

The overall statistical significance of the model is evident from the results of the test of nullity of all regression coefficients (likelihood ratio test), see Table 4. At the same time, the goodness-of-fit test has a *p*-value of 1, so the fit of the model to the data can certainly not be rejected, see Table 4.

As the results from the overall model including all variables were not completely unambiguous, a contingency table was created for each individual dependency. In addition, the contingency tables provided more detailed information on the frequency of purchases of organic products, as the explanatory variable contained several values (the variable "How often do you buy organic products in your household?" was used). The dependence of the frequency of purchases of organic agriculture and food products on the identifying variables was further examined separately for purchases in supermarkets, hypermarkets, and markets. Thus, consumer behaviour in purchasing organic products at different shopping locations was investigated in detail, and respondents were further segmented by gender, age, and education.

The table (Table 5) and the correspondence map (Figure 1) and Figure 2 graph show that respondents buy organic agriculture and food products in hypermarkets most often once a week. In supermarkets, respondents buy organic agriculture and food products most often several times a week, and in markets and farmers' markets they buy organic agriculture and food products least often. A statistically significant relationship was found

between the place of purchase of organic agriculture and food products and the frequency of purchases (chi-square = 694.274, *p*-value is less than 0.001, degrees of freedom = 8).

Table 4. Statistical significance of the model.

−2 Loglikelihood	
Initial model =	2144.7647
Final model =	2118.2913
Reliability Ratio Statistics:	
Chi-square statistics =	26.4733
Degrees of freedom =	3
Right-tale probability =	0.0000
Interpolation Consistency:	
Chi-square statistics =	2264.6072
Degrees of freedom =	2267
Right-tale probability =	1.0000

Source: (Authors' calculations).

Table 5. Contingency table, place of purchase of organic agriculture and food products and purchase frequency.

Column Relative Frequencies	Hypermarket	Supermarket	Markets and Farmers' Markets
Several times a week	20.21%	25.23%	4.49%
Once a week	31.97%	26.16%	6.47%
Once every 14 days	18.63%	15.72%	4.62%
Less often	24.97%	24.17%	43.20%
Never	4.23%	8.72%	41.22%

Source: (Authors' calculations).

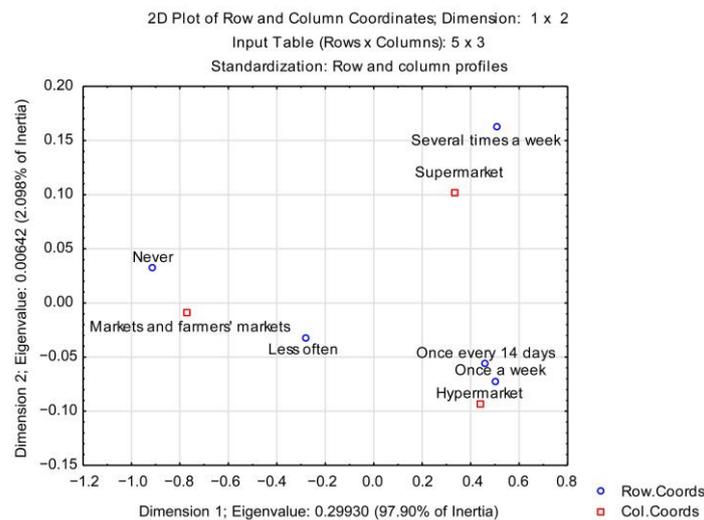


Figure 1. Correspondence maps, place of purchase of organic agriculture and food products and purchase frequency. Source: authors.

Table 6 shows that it is mostly women who buy organic agriculture and food products in hypermarkets, either several times a week or once a week. Men buy organic agriculture and food products less frequently in hypermarkets overall. The statistical significance between the place of purchase (Hypermarket) and the gender of the respondents is borderline (chi-square = 9.369, *p*-value is 0.05, degrees of freedom = 4).

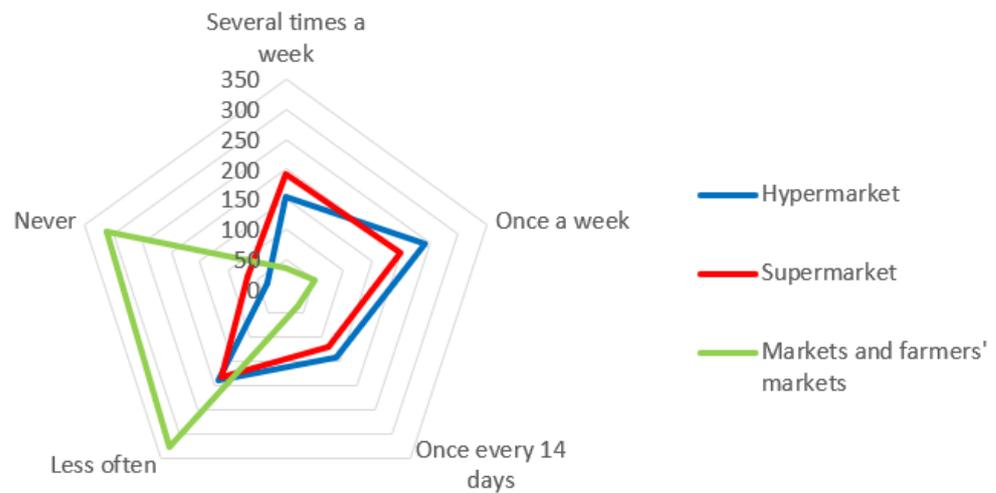


Figure 2. Radar chart, place of purchase of organic agriculture and food products and purchase frequency. Source: authors.

Table 6. Contingency table, Hypermarkets & Respondent’s gender.

Column Relative Frequencies	Men	Women
Several times a week	17.80%	21.50%
Once a week	29.17%	33.47%
Every 14 days (two weeks)	17.80%	19.07%
Less often	28.79%	22.92%
Never	6.44%	3.04%

Source: (Authors’ calculations).

Table 7 shows that men are surprisingly more likely to buy organic agriculture and food products in supermarkets, either several times a week or once a week.

Table 7. Contingency table, Supermarkets & Respondent’s gender.

Column Relative Frequencies	Men	Women
Several times a week	26.52%	24.54%
Once a week	27.65%	25.35%
Every 14 days (two weeks)	14.02%	16.63%
Less often	23.48%	24.54%
Never	8.33%	8.92%

Source: (Authors’ calculations).

Table 8 shows that there is not much difference between the frequency of organic agriculture and food products purchases and gender at markets and farmers’ markets. The table only shows that women are more likely than men to come to markets and farmers’ markets once a week to buy organic agriculture and food products.

Table 8. Contingency table, Markets and farmers’ markets & Respondent’s gender.

Column Relative Frequencies	Men	Women
Several times a week	3.41%	5.07%
Once a week	4.17%	7.71%
Every 14 days (two weeks)	5.68%	4.06%
Less often	43.56%	43.00%
Never	43.18%	40.16%

Source: (Authors’ calculations).

The correspondence map (Figure 3) shows that young respondents under 25 years of age buy organic agriculture and food products in a hypermarket, most often once a week. Respondents aged 26–35 years often buy organic agriculture and food products in the hypermarket several times a week. Older respondents buy organic agriculture and food products less frequently in the hypermarket. A statistically significant relationship was found between the place of purchase (Hypermarket) and the age of the respondents (chi-square = 39.6131, *p*-value is less than 0.001, degrees of freedom = 12).

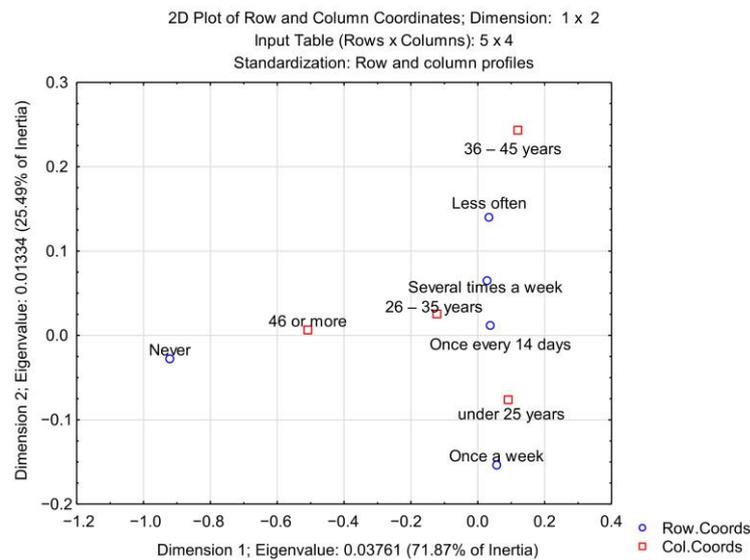


Figure 3. Correspondence maps, Hypermarkets & Respondent’s age. Source: authors.

The correspondence map (Figure 4) shows that respondents under the age of 25 buy organic agriculture and food products in supermarkets most often several times a week. Respondents aged 26–45 buy organic agriculture and food products in supermarkets most often once a week. Older respondents do not buy a large amount of organic agriculture and food products in supermarkets. A statistically significant relationship was found between the place of purchase (Supermarket) and the age of the respondents (chi-square = 46.829, *p*-value is less than 0.001, degrees of freedom = 12).

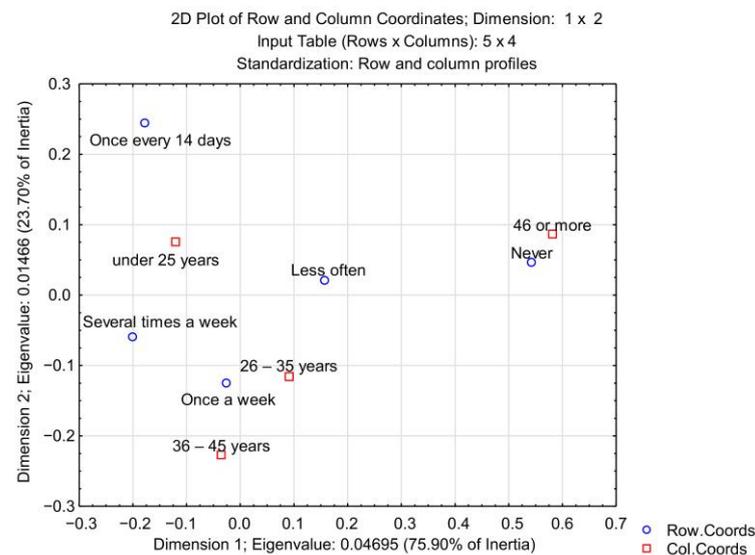


Figure 4. Correspondence maps, Supermarkets & Respondent’s age. Source: authors.

The correspondence map (Figure 5) shows that respondents over 26 years old buy organic agriculture and food products at markets and farmers’ markets most often once a week. Surprisingly, younger respondents under 25 years old are not very fond of shopping at markets and farmers’ markets. A statistically significant relationship was found between the place of purchase (Markets and farmers’ markets) and the age of the respondents (chi-square = 35.3724, *p*-value is less than 0.001, degrees of freedom = 12).

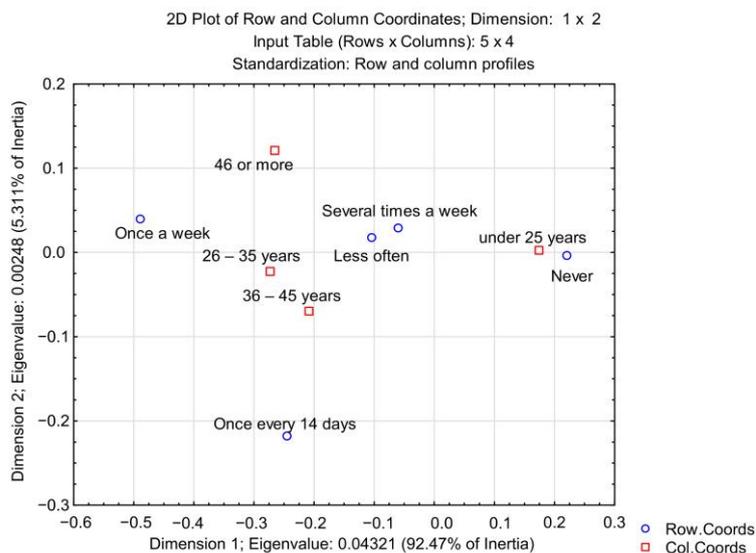


Figure 5. Correspondence maps, Markets and farmers’ markets & Respondent’s age. Source: authors.

The correspondence map (Figure 6) shows that respondents with university degree often buy organic agriculture and food products in hypermarkets several times a week. Secondary school educated respondents buy organic products in hypermarkets mostly only once a week.

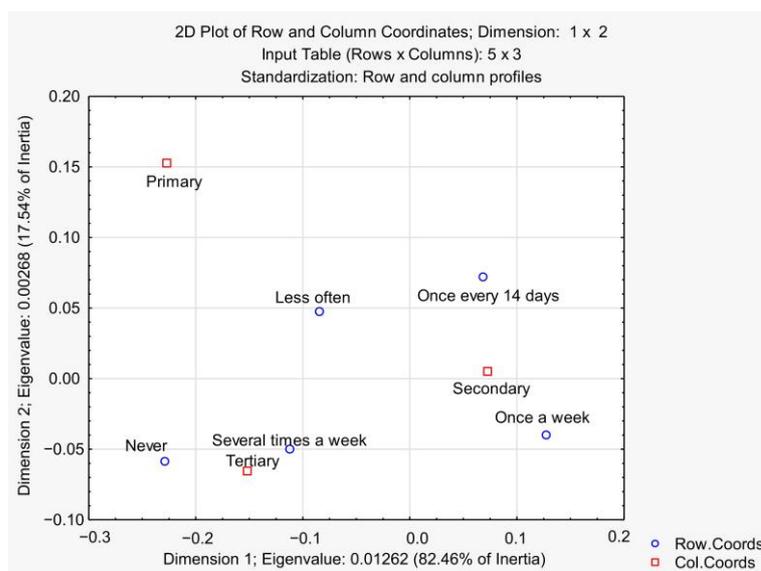


Figure 6. Correspondence maps, Hypermarkets & Respondent’s education. Source: authors.

The correspondence map (Figure 7) shows that university educated respondents buy organic agriculture and food products in supermarkets most often several times a week. Secondary school educated respondents did so most often once a week. This is consistent with the results for hypermarkets.

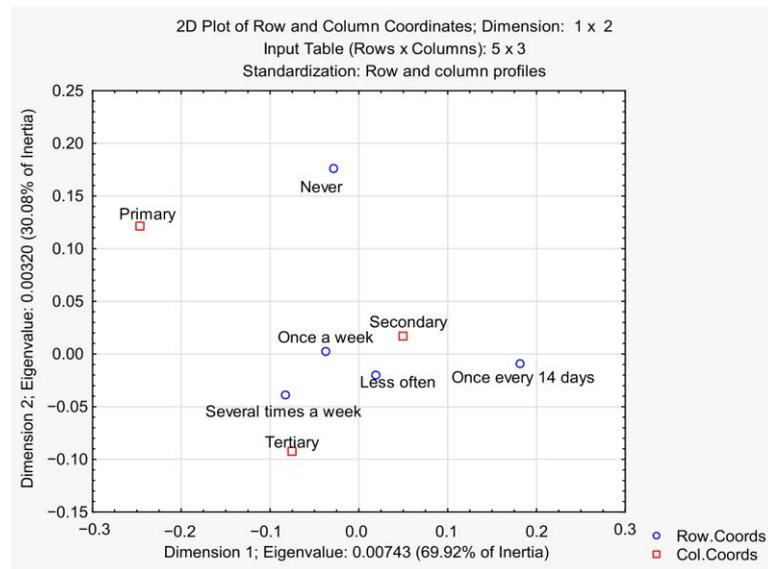


Figure 7. Correspondence maps, Supermarkets & Respondent’s education. Source: authors.

The correspondence map (Figure 8) shows that respondents with university degree most often buy organic agriculture and food products at markets and farmers’ markets once a week or several times a week. Respondents with primary education then often buy organic agriculture and food products at markets only once every 14 days. A statistically significant relationship was found between the place of purchase (Markets and farmers’ markets) and the education of the respondents (chi-square = 60.7309, *p*-value is less than 0.001, degrees of freedom = 8).

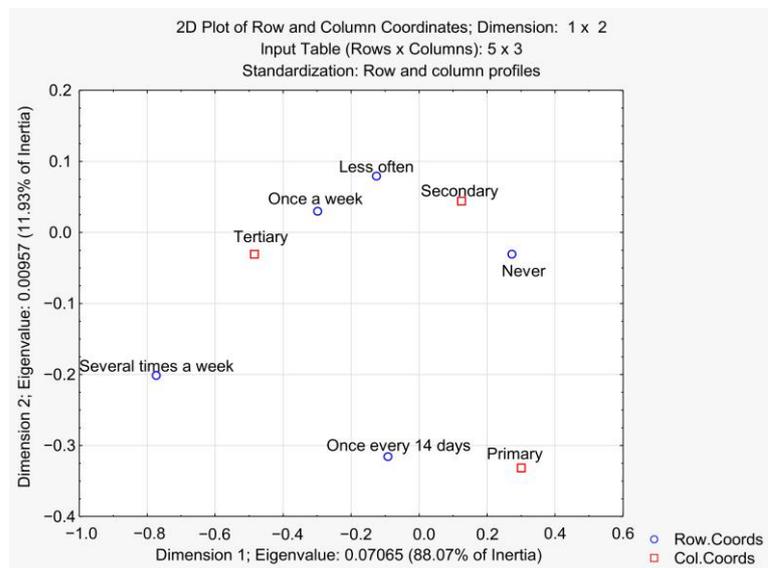


Figure 8. Correspondence maps, Markets and farmers’ markets & Respondent’s education. Source: authors.

In summary, the data was segmented into groups of respondents according to the most frequent place of purchase of organic food. Three summary graphical outputs (Figures 9–11) were produced for all places of purchase and individually for each socio-demographic characteristic of consumers studied.

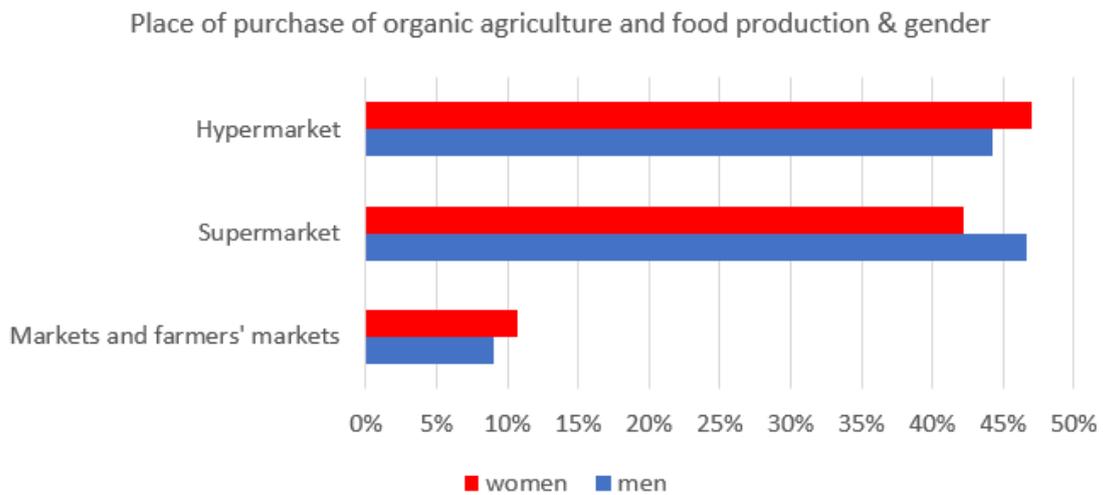


Figure 9. Place of purchase & gender; Source: authors.

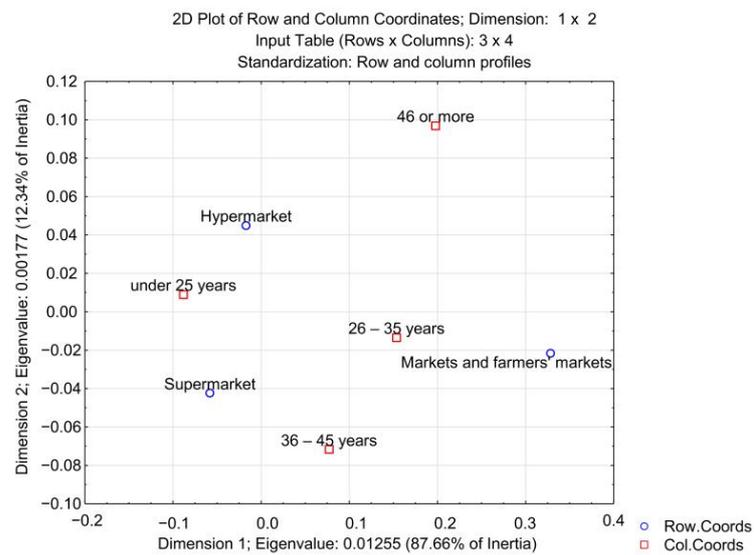


Figure 10. Place of purchase & age. Source: authors.

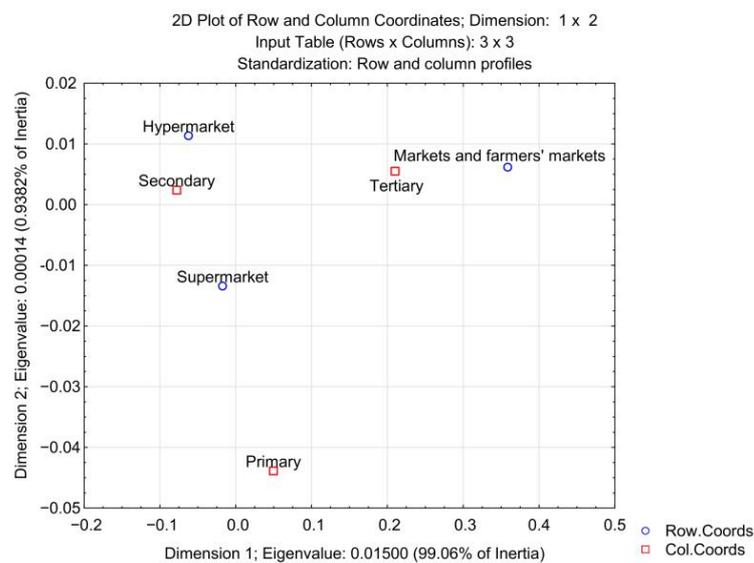


Figure 11. Place of purchase & education. Source: authors.

The graph (Figure 9) shows that only in the case of supermarkets are men more likely to buy organic products; overall the differences by gender are not large.

Older respondents over 45 years old are not very specific about where they buy organic products. Younger respondents under 25 prefer to shop in hypermarkets and supermarkets. Respondents aged 26 to 45 are more likely to buy organic products at markets and farmers' markets, see Figure 10.

Secondary school educated respondents often buy organic products in hypermarkets and supermarkets. Markets and farmers' markets are mainly chosen by university-educated consumers. Respondents with primary education are not very particular about where they buy organic products, see Figure 11.

4. Discussion

Using an overall logistic regression model, the frequency of organic product purchases was found to increase significantly with higher education of respondents. This frequency also increases slightly with age and is higher for women than for men. These results are not consistent with research [47], which found no relationship between frequency of purchases of organic agriculture and food products and education. According to the authors, gender, household income, and number of family members did not affect the frequency of purchases either. In contrast, [48] concluded that factors that influence the frequency of organic agriculture and food products purchases include, among others, age, income, education and the size of the municipality in which the respondents live, among others. These can shape the quality of life and changes in the transformance of the economy towards a green economy [49–51].

Our research shows that respondents buy organic agriculture and food products in hypermarkets most often once a week. In supermarkets it is most often several times a week. Purchases of organic agriculture and food products at markets and farmers' markets are the least frequently used by respondents. The results of the study reported in [52] show that the most important places to buy organic agriculture and food products are local markets and supermarkets or hypermarkets. Moreover, the places where the respondents choose to shop are influenced by the age and gender of the respondents, which is confirmed by our study. In hypermarkets, mostly women buy organic agriculture and food products, either several times a week or once a week. Men buy organic agriculture and food products less frequently in hypermarkets overall. Men are surprisingly more likely to buy organic agriculture and food products in supermarkets, either several times a week or once a week. At markets and farmers' markets, there is not much difference between the frequency of organic agriculture and food products purchases and gender. The research only shows that women are more likely than men to buy organic agriculture and food products once a week at markets and farmers' markets.

Other research [53] also confirms that the majority of consumers currently buy organic products in various supermarkets and hypermarkets. According to the authors, age is an important factor influencing the purchase of organic agriculture and food products. According to [53] it can be stated that consumers of retirement age buy organic agriculture and food products very little. Our research also shows that young respondents under 25 years of age buy organic agriculture and food products in the hypermarket most often once a week. Respondents aged 26–35 often buy organic agriculture and food products in the hypermarket several times a week. Older respondents do not use hypermarkets much to buy organic agriculture and food products.

Our research shows that respondents under the age of 25 buy organic agriculture and food products in supermarkets most often several times a week. Respondents aged 26–45 buy organic agriculture and food products in supermarkets most often once a week. Older respondents (aged 46 and over) do not buy organic agriculture and food products in supermarkets very often. Respondents aged 26 and older buy organic agriculture and food products at markets and farmers' markets most often once a week. Surprisingly, young respondents under 25 do not buy many organic agriculture and food products at

markets and farmers' markets. Yet the results of a survey of 20–34-year-olds reported in [54] showed that more than half of the respondents had at least once encountered the concept of alternative food networks (markets). Most often respondents said that they had personal experience of buying organic agriculture and food products.

5. Conclusions

The aim of the paper was to assess the purchasing habits of consumers from the Czech Republic when buying organic agriculture and food products, with an emphasis on the place of purchase of organic agriculture and food products, especially the purchase with the shortest logistics chain—i.e., purchase at farmers' markets, or directly from the producer—and a comparison with the currently most common places of purchase of the organic products in the Czech Republic, supermarkets and hypermarkets. Using an overall logistic regression model, the frequency of organic product purchases was found to increase significantly with higher education of respondents. This frequency also increases slightly with age and is higher for women than for men. It is clear from the research that respondents buy organic agriculture and food products in hypermarkets most often once a week. In supermarkets, respondents buy organic agriculture and food products most often several times a week. Purchases of organic agriculture and food products at markets and farmers' markets are the least frequent. Mostly women buy organic agriculture and food products in hypermarkets several times a week or once a week. Men buy organic agriculture and food products less frequently in hypermarkets overall. Surprisingly, men are more likely to buy organic agriculture and food products in supermarkets several times a week or once a week. At markets and farmers' markets, there is not much difference between the frequency of organic agriculture and food products purchases and gender. The research only shows that women are more likely than men to buy organic agriculture and food products once a week at markets and farmers' markets. The research also shows that young respondents under 25 buy organic agriculture and food products in a hypermarket most often once a week. Respondents aged 26–35 often buy organic agriculture and food products in the hypermarket several times a week. Older respondents do not use hypermarkets much to buy organic agriculture and food products. The research shows that respondents under 25 years of age buy organic agriculture and food products in supermarkets most often several times a week. Respondents aged 26–45 buy organic agriculture and food products in supermarkets most often once a week. Older respondents (aged 46 and more) do not buy organic agriculture and food products in supermarkets very often. Respondents over 26 years of age buy organic agriculture and food products at markets and farmers' markets most often once a week. Surprisingly, young respondents under 25 do not make many purchases of organic agriculture and food products at markets and farmers' markets. The research also shows that university-educated respondents often buy organic agriculture and food products in hypermarkets several times a week. Secondary school educated respondents buy organic in hypermarkets mostly only once a week. The situation is similar for purchases of organic agriculture and food products purchased in supermarkets. The research also shows that university-educated respondents most often buy organic at markets and farmers' markets once a week or several times a week. Respondents with primary education often buy organic at markets and farmers' markets only every two weeks.

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