Determinants of Self-Supply of Food and Services in Rural Households in Poland Using Canonical Analysis

Paulina Trębska[1], Agnieszka Biernat-Jarka[2]

Abstract:

Purpose: The purpose of the study was to assess the size and structure of self-supply of food and services in rural households and to indicate the hierarchy of factors determining the choice of this form of consumption in the discussed households in Poland.

Design/Methodology/Approach: The level and structure of self-supply of food and services in rural households depend on the simultaneous action of many factors. The impact of these determinants on consumption behavior in the researched rural households was examined using the canonical correlation analysis. The study period concerned 2017.

Findings: Significant determinants in the conducted study turned out to be the variables describing the number of children in a household and the number of people permanently working on a farm. Household income, the assessment of economic living conditions in Poland, or the type of commune in which the respondents lived also turned out to be an important factor influencing the level of self-supply of food and services in the surveyed rural households.

Practical Implications: The article allows to assess the scale of the phenomenon and the determinants of self-supply with food and services, which gained a new meaning during the lockdown period during the COVID-19 pandemic.

Originality/Value: There are no analyses in the literature describing prosumer behavior related to the production of food and the provision of services by all households in rural areas, both those related to agriculture and non-agricultural ones.

Keywords: Rural households, food self-supply, services, income, canonical correlation analysis.

JEL codes: C18, C83, D03, D12, D13.

Paper type: Research paper.

[1]*Warsaw University of Life Science - SGGW, Poland, e-mail:* paulina_trebska@sggw.edu.pl
[2]*Warsaw University of Life Science - SGGW, Poland,*
e-mail: agnieszka_biernat_jarka@sggw.edu.pl

1. Introduction

Although the countryside has undergone numerous transformations in recent years, losing many features of the traditional local community, there are still features differentiating households in rural areas from those located in cities. Most households strive to meet the needs of members as much as possible. In the era of commercialization of consumption and life on the run, households wanting to live in harmony with nature return to self-supply as a form of satisfying consumer needs. Food self-supply is the oldest form of obtaining raw materials and products to meet the needs of the household. Food self-supply is also defined in the literature as natural consumption or self-consumption and means a part or all the production, generated on a farm or on an allotment, which is intended for consumption by people living on the farm or for production purposes (Biernat-Jarka and Tuka, 2015).

By examining households and the scope of activities performed on their own, Toffler (1980) defines the substitution of market services by personal performance as presumption. As a prosumer (from the combination of the words producer and consumer), he considers a person who, instead of using market services, performs them himself. The consumer faces the choice of buying goods and services on the market or self-consumption, which is the most effective way of satisfying the needs of household members, allowing to minimize the effects of inflation, and favoring the protection of the level of fulfillment of needs (Fox, 2014). The use of self-supply services and goods that meet basic needs that lead to a better quality of life while reducing the consumption of natural resources, damage, and pollution during the life cycle of a product or service is an example of sustainable consumption (Utzig, 2017).

The purpose of the study was to assess the size and structure of self-supply of food and services in rural households and to indicate the hierarchy of factors determining the choice of this form of consumption in the discussed households.

2. Literature review

Consumption is the never-ending process of using goods and services to meet human needs. Samuelson and Nordhaus (1985) define consumption as the expenditure of households on goods and services such as food, clothing, cars, healthcare, housing. The consumption process does not only mean meeting biological, material, and economic needs, but also the needs resulting from the structure of the personality, i.e., mental, social and cultural needs.

Consumption is one of the key determinants of people's lifestyles. In the behavior of modern consumers, deep and intense changes are also observed, which concern the hierarchy of needs, levels, ways, means of satisfying them, as well as criteria for making choices (Piekut, 2017). Consumption patterns have many variations both in time and space. There are many differences between rural and urban communities.

Households in rural areas are of production and consumption character, while households in urban areas - mainly consumption ones. The dissimilarity of urban and rural households justifies different ways of obtaining and distributing income. In the budget of rural households, these differences result from a clear interpenetration of their productive and consumption character.

The household consumes products and services that meet various needs. Consumption in households is influenced by many factors (Szwacka-Mokrzycka, 2018). These differences result from the influence of a complex of factors of an endogenous nature (e.g., age and education of the head of household) and exogenous (e.g., infrastructure, the situation on the labor market). Factors shaping the needs and behavior of households include demographic, economic, socio-professional, biological, and psychosocial factors (Szwacka-Mokrzycka, 2019).

Differences in the character of households in rural and urban areas and the accompanying different value systems adopted in both types of the local community contribute to reporting different demand for goods and services, which determines the differences in consumption patterns in both categories of households (Zalega, 2014). Rural households are particularly treated by Gary Becker's theory of consumption, which assumes that households are both consumers and producers of goods because they produce a specific set of "products", i.e. eating, cleaning, cooking, which contributes directly to the satisfaction of needs (Becker, 1976). Becker believed that the household as the basic unit in the sphere of consumption and production, with objective constraints resulting from the disposable income and time at his disposal, aims to maximize its production.

According to Becker, the household utility function takes the form of $U = u\,(Z_1, Z_2, \ldots, Z_n)$, where Z_1, Z_2, Z_n are amounts of goods and services they provide. The household production function is determined by the combination of the number of market goods (x_i), the amount of available time (t_i) and the variable determining the environment in which the production process of E takes place. An environmental variable represents the state of production skills or the level of technology used in the production process (for households, it means the ability to use a specific set of goods). The household utility function is maximized under the constraints resulting from the production function and due to the amount of time available in a given household.

3. Materials and Methods

The research material used in the study was the own survey conducted in 2017, according to the survey questionnaire, which covered the population of 302 households located in rural areas of the Mazowieckie Voivodeship. Rural households were intentionally selected for the study, because they account for over 40% of all Polish households, and according to successive censuses and Central Statistical Office of Poland forecasts, their number in Poland will continue to grow.

This choice was also dictated by the fact that a greater percentage of farms in rural areas than in cities use self-supply with food and services, which results from the premises discussed above. To measure the level of self-supply of food and services, the consumption structure measure was used, defining the share of food and services from self-supply in total consumption, determined by the formula:

$$Sn = \frac{Ss}{So} * 100\%,$$

$\quad$ Sn – the level of self-supply of food or services,
$\quad$ Ss – share of self-supplied food or services,
$\quad$ So – total consumption of food or services.

The index may take values from 0 to 1, where 0 means a complete lack of self-supply of food or services, and 1 - consumption of food or services exclusively derived from self-supply. The respondents declared the level of self-supply in their households as a percentage. This variable takes the following values:

$\quad$ 0 – very low level of self-supply ($Sn \leq 25\%$),
$\quad$ 1 – low level of self-supply ($25\% < Sn \leq 50\%$),
$\quad$ 2 – medium level of self-supply ($50\% < Sn < 75\%$),
$\quad$ 3 – high level of self-supply ($Sn \geq 75\%$).

The level and structure of self-supply of food and services in rural households depend on the simultaneous action of many factors. The influence of these determinants on consumption behavior in rural households can be examined using multidimensional statistical analyzes (Piekut, 2008). One method is the canonical correlation analysis that was used in this study. The condition for the analysis of the canonical correlation was to convert the qualitative features into zero-one (0-1) variables. The value of the level of significance assumed in the model was adopted for p <0.05.

Canonical correlation analysis is a statistical method that was introduced in the 1930s by Harold Hotelling (1936). This method is a procedure for estimating the relationship between two sets of features. It is a generalization of multiple regression into two groups of variables and thus allows us to know whether the variability of one group of features can be used to predict the variability of another group of features. It focuses on the correlation between the linear combination of variables in the first set and the linear combination of variables in the second set:

X - the first set of variables (dependent variables), a random vector with the dimension *p,*
Y - the second set of random variables (independent variables, predictors), a random vector with the dimension *q.*

We assume that p≤q.

For these vectors we denote:

$$E(X) = \mu_x \; ; \; E(Y) = \mu_y \; ; \; Cov(X) = \sum{}_{11} \; ; \; Cov(Y) = \sum{}_{22} \; ; \; Cov(X,Y) =$$

$$= \sum{}_{12} = \sum{}_{21}'$$

Linear combinations for X and Y vectors allow for a clear summary of the dependencies of a set of variables:

$$U = a'X = [a_1 a_2 \ldots a_p] \begin{bmatrix} X_1 \\ X_2 \\ \ldots \\ X_p \end{bmatrix}$$

$$V = b'X = [b_1 b_2 \ldots b_q] \begin{bmatrix} Y_1 \\ Y_2 \\ \ldots \\ Y_q \end{bmatrix}$$

The first pair of canonical variables is a pair of linear combinations of U_1 and V_1 with such canonical coefficients that the correlation is as large as possible. The K-th pair of canonical variables is called a pair of linear combinations U_k and V_k having canonical coefficients that maximize the correlations among all selections that are uncorrelated with (k-1) previous pairs of canonical variables. Properties of canonical variables (Hardoon *et al.,* 2004):

$$Var(U_k) = Var(V_k) = 1$$
$$Cov(U_k, U_l) = Corr(U_k, U_l) = 0, k \neq l$$
$$Cov(V_k, V_l) = Corr(V_k, V_l) = 0, k \neq l$$
$$Cov(U_k, V_l) = Corr(U_k, V_l) = 0, k \neq l$$
$$k, l = 1,2, \ldots, p$$

Statistical analysis was performed with the use of SPSS and Excel.

4. Results and Discussion

Self-supply of food and services is an essential element in the structure of household budgets, especially among farmers, inhabitants of rural areas and the less wealthy people. During the survey, respondents were asked to what extent in their households they use fresh food from their crops or breeding, use home-made products, provide care for children and dependents, perform home repairs, use their means of transport. The declared level of self-supply in the surveyed households was high.

Figure 1. *Declared level of self-supply of food in the surveyed households in Poland*
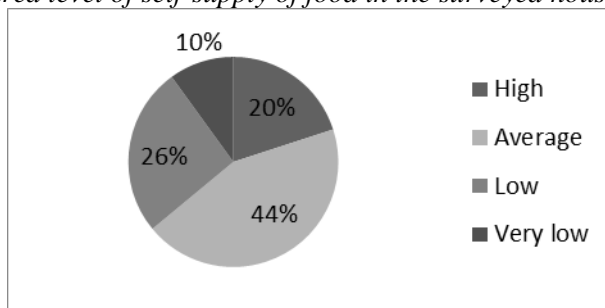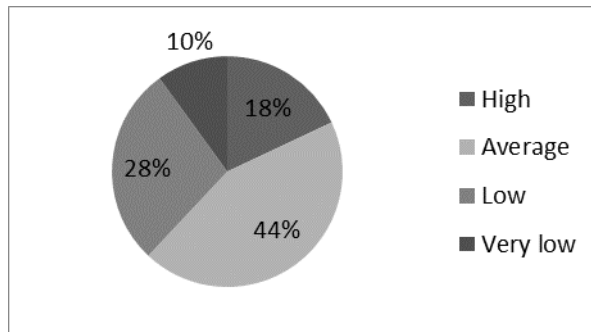

Source: Own calculations.

Every fifth household declared a high level of self-supply of fresh food and home products. Only 10% of households used this form of consumption to a very low degree (Figure 1). Self-supplied food is primarily fresh vegetables and fruits, home-made products, fresh milk, eggs, meat.

Figure 2. *Declared level of self-supply of care services in the surveyed households in Poland*
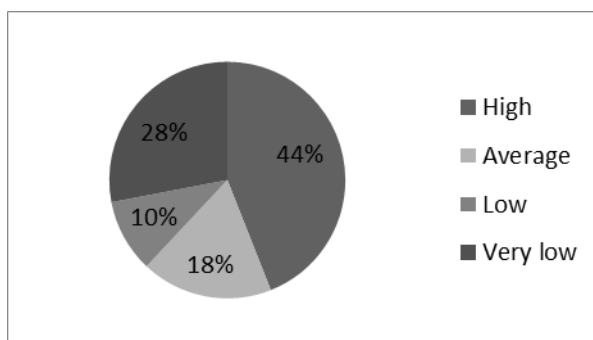
Source: Own calculations.

The results of the research also allow us to observe a significant percentage of respondents (44%) who deal with almost all household care services on their own (Figure 2). Household care services are mainly looking after children or elderly people. Families, where only some of the care services are performed personally by family members, use the services of the so-called incoming babysitters. While some household activities may be performed by outsiders, they are always organized and supervised by members of the homegroup and aimed at directly enabling the needs of that group to be met. Only one in ten households undertook very little repairs of household appliances, devices, machines, cars, etc. on their own. In turn, 18% of respondents claim that they perform almost all domestic services at home (Figure 3). Resignation from performing specialist services in the field of repair of RTV and household appliances within your household may result from the fact that such equipment is more and more complicated and therefore sometimes even impossible to repair yourself.

Figure 3. *Declared level of self-supply of repair services in surveyed households in Poland*

Besides, modern home equipment rarely breaks down, and old, worn-out equipment is subject to replacement rather than repair. In turn, a lot of minor repairs on the car can also be done on your own. For years, tinkering with a car has been one of the main activities of Poles in their free time. Currently, there are many guides available in the press, television, and the Internet on how to repair the car yourself, without taking it to the car repair shop.

Figure 4. *The declared level of self-supply of transport in the surveyed households in Poland*
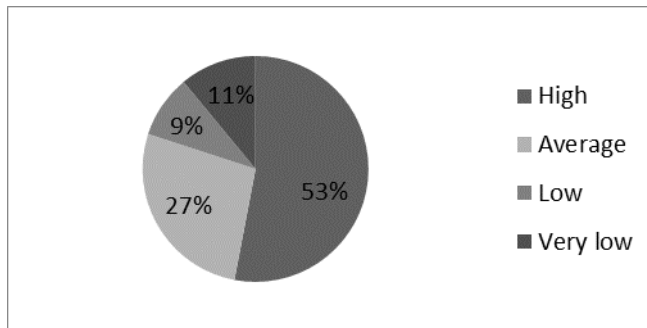
More than half of the surveyed households used their means of transport only, and every tenth household did not organize its transport (Figure 4). According to the data from the Central Statistical Office, 65% of Polish households owned a car in 2017. Rural households much more often owned a car (73%) than those in the city (59%).

Determinants of the level and structure of self-supply of food and services in rural households were examined based on the analysis of canonical correlation, wherein the created model 33 independent variables and 4 dependent variables were taken into account.

Table 1. *List of independent and dependent variables with their explanation*

Name variabl	Explanation
Independent variables	
x1	Type of communes by classes of the level of socio-economic development of a commune
x2	Type of communes by problem areas of agriculture factors
x3	The value of the development measure *di*
x4	Type of commune (rural, urban-rural)
x5	Age of the head of the family
x6	Education of the head of the family
x7	Household category according to the generation criterion
x8	Household category according to the criterion of linking with agriculture
x9	The total area of the farm (own and leased land) in ha
x10	Having the main production direction
x11	Household size
x12	Number of children up to 14 in the household
x13	Number of farmers in the household
x14	The number of unemployed registered in the Labor Office in the household
x15	Number of pensioners in the household
x16	Number of annuitants in the household
x17	Number of permanent full-time workers that are necessary on the farm
x18	Share of agricultural income in the overall structure of family income (in%)
x19	Average monthly per capita income in a household over the last year
x20	Households burdened with debt repayment
x21	The standard of living of the family compared to the standard of living of the families in the immediate vicinity
x22	Assessment of the respondent's equipment with household appliances
x23	Assessment of the respondent's equipment with mobility equipment
x24	Assessment of the standard of living
x25	Assessment of transport infrastructure in the immediate vicinity
x26	Assessment of the availability of kindergartens and nurseries in the immediate vicinity
x27	Assessment of the variety of shops in the immediate vicinity
x28	Assessment of the availability of craft services in the immediate vicinity
x29	Poczucie przynależności do społeczności lokalnej
x30	Assessment of social relationships with friends
x31	A sense of belonging to the local community
x32	Assessment of the political situation in Poland
x33	Assessment of the economic conditions of life in Poland
Dependent variables	
y1	Level of household self-supply of food
y2	The level of self-supply of the household of care services for children and elderly people
y3	The level of self-supply of the household of home repairs of machinery and equipment
y4	The level of self-supply of the household of transport on its own

Source: *Own calculations.*

The next step in the canonical analysis is to remove insignificant variables from the model. Significance is assessed based on the significance of correlation of the input fields with the canonical fields. Only those variables that do not have a significant correlation with any canonical variable are removed. Four canonical variables were distinguished in the study.

Table 2. *Variance in dependent variables explained by canonical variables*

Can. Var.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1 (foord)	33,00908	33,009080	9,18288	9,18288
2 (care)	30,77442	63,783500	4,66573	13,84861
3 (repairs)	14,12444	77,907940	1,49005	15,33866
4 (transport)	22,09206	100,000000	1,07737	16,41603

Source: Own calculations.

Table 2 shows how much of the variance of the dependent variable set is explained by a given canonical variable. The most important is variable 1 (food) - it explains 33% of the variance of dependent variables, and the least important variable 3 (repairs) - it explains 14.1% of the variance of dependent variables. Ultimately, 12 independent variables and 4 dependent variables were included in the created model.

Table 3. *Variance in covariates explained by canonical variables*

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1 (food)	2,1228	2,122800	7,63069	7,63069
2 (care)	1,21696	3,339760	8,02687	15,65756
3 (reparis)	0,63014	3,969900	5,97318	21,63074
4 (transport)	0,3395	4,309400	6,9617	28,59244

Source: Own calculations.

Table 3 shows how much of the covariates are accounted for by the canonical variables. In total, they include 28.59% of the information contained in the explanatory variables, with the second variable (8%) containing the most information and the third variable (6%) the least.

After removing the insignificant variables, a model was obtained that contains only the significant variables. The following Tables show the results of the final model. The variables in the table have been sorted according to the value of the beta coefficient, which determines the strength of the influence of the independent variable on the dependent variable, which means that the higher (in terms of the modulus) the beta coefficient, the stronger the given independent variable influences the given dependent variable.

Table 4 presents the characteristics of the variables having a significant impact on the level of self-supply of food in the surveyed rural households. The analysis showed that the level of food self-supply is higher in rural communes than in urban-rural communes. Due to the location in rural communes, there are more households

related to agriculture and greater possibilities of self-production of food. Moreover, in communes characterized by a smaller number of factors determining problem areas of agriculture, the level of food self-supply was higher. Along with the increasing difficulties in running agricultural production in a given commune, the level of self-supply of food decreased.

Table 4. *Variables having a significant impact on the level of self-supply of food in the surveyed rural households in Poland*

COVARIATE	B	Beta	Std. Err.	t-Value	Sig. of t	Lower -95%	CL- Upper
x12	0,1058193160	0,1103477372	0,03837	2,75782	0,003	0,03044	0,18120
x2	-0,1917109574	-0,1189645162	0,06317	-3,03492	0,006	-0,31581	-0,06761
x25	0,1242597036	0,1257060367	0,03961	3,13676	0,002	0,04643	0,20208
x22	-0,1649213303	-0,1337847886	0,05867	-2,81088	0,005	-0,28019	-0,04965
x33	0,1572332026	0,1445387367	0,04374	3,59479	0,000	0,07130	0,24316
x19	0,0031217772	0,1483501971	0,00114	2,73482	0,006	0,00088	0,00536
x4	0,2947134256	0,1537691032	0,07687	3,83392	0,000	0,14370	0,44573
x17	0,2093813146	0,1680446681	0,05017	4,17374	0,000	0,11083	0,30794
x30	-0,2626415156	-0,1872832198	0,0872	-3,01206	0,003	-0,43395	-0,09134

Source: *Own calculations.*

In the households surveyed, where members defined their status as farmers, the level of self-supply was higher. The greater the number of farmers in the household, the higher the level of self-supply. The respondents, describing themselves as farmers, most likely own a farm where they can produce plants or livestock. Looking at the beta coefficients, this variable has the strongest impact on the level of food self-supply in the surveyed households.

The higher the number of children under 14 in the household, the higher the degree of self-supply of food. It can be presumed that households with children should pay particular attention to the quality of food consumed. Children are most at risk of exceeding the daily intake of food additives currently present in food, which may cause allergies and affect their further development. Food given to children should not contain preservatives and should come, to the greatest extent, from organic farming, where no fertilizers or plant protection products are used.

It could be presumed that the difficult access to transport services in the vicinity of the respondents' residence results in a greater supply of food on their farm due to difficulties in traveling to shopping for larger stores. However, studies have shown the opposite relationship. Along with the improvement in access to transport, the level of self-supply of food increases in the surveyed households.

The canonical analysis showed that the higher the number of permanent full-time workers that are necessary on a farm, the higher the level of food self-supply. People working on a farm, dealing with crop and livestock production as part of their working time, may, as part of their activities, transfer products of their choice for consumption by all members of the household.

Important factors influencing the amount of self-supply of food include the degree of economic development of the country and the level of income achieved by society (Zalega, 2008a). The research shows that a better financial condition of farmers' households implies a lower percentage of households using self-supply. Other studies show that tradition and the patterns of food consumption formed over the years may influence the shaping of natural consumption to a greater extent than the level of the population's income (Zalega, 2008b). The literature emphasizes that with the increase in farmers' incomes, the importance of self-supply in satisfying consumption needs will decrease, which is different from the results of the analysis, but it should be emphasized that it concerns rural residents, not only farmers.

The analysis of the canonical correlation showed that the higher the average monthly income per person in the studied household, the higher the level of self-supply of food. On the other hand, in households where the respondents defined the economic conditions of living in Poland, the degree of self-supply was higher than in households where the respondents assessed these conditions as better.
Variables describing the assessment of social relationships with friends and household equipment with household appliances also turned out to be significant in the analysis of food self-supply.

Table 5. *Variables having a significant impact on the level of self-supply of food in the surveyed rural households in Poland*

COVARIATE	B	Beta	Std. Err.	t-Value	Sig. of t	Lower -95%	CL- Upper
x17	0,1600389781	0,0878320863	0,07818	2,04694	0,041	0,00644	0,31364
x12	0,4872821463	0,3474718248	0,05980	8,14840	0,000	0,36980	0,60477

Source: *Own calculations.*

Only two variables had a significant impact on the level of self-supply in the field of care services for children or elderly people in the surveyed households (Table 5). They were the number of children under 14 in the household and the number of permanent full-time workers that are necessary on the farm. Both variables had a positive effect, which means that the higher number of children and the higher number of people necessary for agricultural activity significantly increased the degree of self-supply in this type of service. The beta coefficient shows that the effect of the number of children was much stronger than that of the number of people necessary for agricultural activity. This means that the number of children was by far the strongest predictor of the level of self-care in terms of care. The variable concerning the respondents' assessment of the availability of kindergartens and nurseries in the immediate vicinity turned out to be insignificant in this study.

The analysis showed that the level of self-supply of households of repair services at home, appliances and cars is significantly higher in rural communes than in urban-rural communes. In the surveyed households with unemployed people registered at the labor office, the scope of repairs performed in person is much higher. The more unemployed in a household, the higher the level of self-supply of services.

Table 6. *Variables having a significant impact on the level of self-supply of home repair services, appliances, car in the surveyed rural households in Poland*

COVARIATE	B	Beta	Std. Err.	t-Value	Sig. of t	Lower -95%	CL- Upper
x22	-0,1233582636	-0,1058519421	0,05994	-2,05811	0,040	-0,24111	-0,00561
x14	0,2053448205	0,1058978919	0,08365	2,45477	0,014	0,04100	0,36969
x25	0,1159994360	0,1241316060	0,04047	2,86644	0,004	0,03650	0,19550
x12	0,1187540262	0,1309928225	0,0392	3,02959	0,003	0,04175	0,19576
x4	0,2392732020	0,1320577514	0,07853	3,04700	0,002	0,08500	0,39355
x17	0,1039286380	0,1503900724	0,04005	2,59481	0,010	0,02524	0,18262

Source: *Own calculations.*

Probably, repairs in such households are the responsibility of the unemployed. Also, in households with small children, more repairs are performed. The higher the number of children under 14 in the household, the higher the degree of self-supply of home repair services, machinery, and equipment.

The variable describing the number of permanent full-time workers that are necessary on the farm turned out to have a significant impact on the level of self-supply in-home repair services, machinery, equipment, car, etc. The more people who work permanently full-time that are necessary on the farm, the more repairs are performed on their own. This may be because these repairs concern not only household appliances, but also machines and devices that farmers use in their work.

The variables describing the quality of transport in the area and household equipment with household appliances also turned out to be significant in the analysis of the level of self-supply of repair services. The better the household equipment is equipped with household appliances; the fewer repair services are performed by the household members on their own.

Table 7. *Variables having a significant impact on the level of self-supply of transport in the surveyed rural households in Poland*

COVARIATE	B	Beta	Std. Err.	t-Value	Sig. of t	Lower -95%	CL- Upper
x12	0,0941738145	0,0874666941	0,04665	2,01855	0,044	0,00252	0,18583
x6	0,1268001637	0,1048972365	0,05449	2,32722	0,020	0,01976	0,23384
x21	0,2651295309	0,1951959710	0,06765	3,91938	0,000	0,13223	0,39803

Source: *Own calculations.*

The following variables affect the independence of the surveyed households in terms of self-supply of transport:

- education of the head of the farm - the higher it is, the higher the level of self-supply of transport;
- the number of children under 14 in the household - the higher it is, the higher the level of self-supply of transport;

- the standard of living of the family compared to the standard of living of the families in the immediate vicinity – the higher it is, the higher the level of self-supply of transport.

Two issues arise when analyzing the results. The first is that if there are small children in the family, the parents should have a car, which makes it easier to travel with the child and to get to school or a doctor faster. The second is that a higher standard of living goes hand in hand with having a car, or even several, for each family member who has a driving license.

By far the strongest impact on the degree of self-supply is exerted by the standard of living, for which the beta coefficient was obtained much higher than in the case of other variables.

5. Conclusions

A significant role in the study of household self-supply is played by their social and demographic characteristics, which, together with the level of income, are responsible for creating specific consumption structures in households. The results of the canonical analysis showed many obvious facts, which confirms the effectiveness of using this type of tool in household surveys. However, the obtained results also showed the hierarchy of factors influencing the level of income in households. Canonical analysis ordered the variables and hierarchized them. Such a result is rare in studies with other methods.

The analysis of the canonical correlation showed that the most important determinants in terms of self-supply with food and services in rural households are the number of children owned by the family, the education of the head of the family, and the level of household income, which is related to the standard of living of household members. Moreover, the number of permanent full-time workers on the farm is of great importance. The consumption needs and behavior of household members are a complex phenomenon and depend on many factors.

Due to the variety of determinants shaping consumption, the market behavior of household members is not always predictable. In the behavior of modern consumers, deep and intense changes are also observed, which concern the hierarchy of needs, levels, methods, means of satisfying, and criteria for making choices. New trends in consumption lead to the modification of systems and the value of the vast majority of people. The level of self-supply is determined by economic, social, and environmental conditions. In the past, economic factors dominated, while nowadays, health and environmental considerations are increasingly dominant.

Prosumer behavior related to running a household, self-production of food, and providing services on their own gained importance again in the era of lockdown

during the COVID-19 pandemic. For example, having your own car was appreciated to reduce travel by public transport.

Factors influencing the growth of self-service during the COVID-19 pandemic:

• Lack of availability of certain market services - closure of service points,
• Fear of getting infected in shops or in public transport,
• Limiting contacts with other people (babysitters, home help, companies providing repair and repair services),
• More time spent at home - looking for additional activities in the form of renovations, carrying out simple repair works at home, caring for the garden, food self-supply.

References:

Becker, G.S. 1976. The economic approach to human behavior. University of Chicago Press, Chicago.

Biernat-Jarka, A., Tuka, P. 2015. Food self-supply and income of rural households. Acta Scientiarum Polonorum. Oeconomia, 14 (3), 5-14.

Fox, S. 2014. Third Wave Do-It-Yourself (DIY): Potential for prosumption, innovation, and entrepreneurship by local populations in regions without industrial manufacturing infrastructure. Technology in
Society, 39, https://doi.org/10.1016/j.techsoc.2014.07.001.

GUS. 2016. Household budget survey in 2017, Warsaw.

Hardoon, D.R., Szedmak, S., Shawe-Taylor, J. 2004. Canonical Correlation Analysis: An Overview with Application to Learning Methods. Neural Computation, 16(12), 2639-2664. doi:10.1162/0899766042321814.

Hotelling, H. 1936. Relations Between Two Sets of Variates. Biometrika. 28(3-4), 321-377. doi:10.1093/biomet/28.3-4.321.

Piekut, M. 2017. Youth versus old age – consumption determinants. Acta Scientiarum Polonorum. Oeconomia, 16(2), 109-116.
https://doi.org/10.22630/ASPE.2017.16.2.23.

Samuelson, P.A., Nordhaus, W.D. 1985. Economics. McGraw-Hill, 12th edition.

Szwacka-Mokrzycka, J. 2018. The impact of the level of economic development on food consumption in Poland. Proceedings of the 2018 International Conference "Economic Science for Rural Development" No 48 Jelgava, LLU ESAF, 9 11 May 2018, 402-408. DOI 10.22616/ESRD.2018.111.

Szwacka-Mokrzycka, J. 2019. Interdisciplinary take on food consumption. Proceedings of the 2019 International Scientific Conference 'Economic Sciences for Agribusiness and Rural Economy' No 3, Warsaw, 5-7 June 2019, 139-144, DOI: 10.22630/ESARE.2019.3.18.

Toffler, A. 1980. The Third Wave. William Collins Sons & Co. Ltd, New York.

Utzig, M. 2017. Sustainable consumption of rural and urban households in Poland. Acta Scientiarum Polonorum. Oeconomia, 16(2), 135-144, DOI: 10.22630/ASPE.2017.16.2.26.

Zalega, T. 2008a. Consumption Determinants in Polish Households with Unemployed Members in the Years 2000-2006. In: M. Baliamoune-Lutz, A.Z. Nowak, J. Steagall

(eds), Global Economy in Search of New Ideas and Concepts, Coggin Collegge of Business, Vol. 1, University of North Florida, Jacksonville.

Zalega, T. 2008b. Human Needs and Their Hierarchy vs. the Contemporary Theories of Consumption. In: A.Z. Nowak, B. Glinka, P. Hensel (eds), Business Environment In Poland. The Selected Managerial and Economic Aspects and Their Interconnections, Warsaw: Scientific Publisher of the Faculty of Management at the University of Warsaw.

Zalega, T. 2014. Sustainable consumption and innovative consumption in consumer behaviour of Mazovian households. Handel Wewnętrzny, 4(351), 311-323.