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tel. 22 593 55 20
e-mail: wydawnictwo@sggw.edu.pl
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ECONOMIC CONDITIONS OF THE DEMAND FOR INVESTMENT AND WORKING CAPITAL LOANS FOR MICRO-ENTERPRISES – RESEARCH FOR POLAND DURING COVID-19

Rafał Balina[1] ✉, Adam Zając[2], Marta Idasz-Balina[3]

[1] Warsaw University of Life Sciences – SGGW, Poland
[2] Cardinal Stefan Wyszynski University in Warsaw, Poland
[3] Kozminski University, Poland

ABSTRACT

Aim: The study aims to find an answer to the question of whether and how the economic indicators in the industrial processing, construction, trade, and services sectors reflect changes in the market size related to investments and working capital loans for micro-enterprises. **Methods:** The study used data on investment and working capital loans and data on economic conditions. Monthly data for the years 2019–2021, covering the period of the COVID-19 pandemic, were used for the analyses. The estimation of dynamic models was carried out using the Generalized Method of Moments (GMM). **Results:** The conducted research showed that economic factors play a significant role in shaping the demand for investment and working capital loans in the micro-enterprise sector, but the impact of the economic situation was more significant in the case of investment loans than working capital loans. In periods of economic prosperity, micro-enterprises are more likely to take out investment loans than in periods of economic downturn. Micro-enterprises' propensity to take out working capital loans is more dependent on their current situation and expectations regarding the demand for products and services. **Conclusions:** The research revealed differences in the characteristics of the factors significantly influencing the demand for credit, depending on the sector to which the indicator is concerned. The research shows that access to external financing is crucial for the functioning, survival, and expansion of micro, small, and medium-sized enterprises. The research fills the literature gap by showing how the economic situation in individual industries affects the credit market for the micro-enterprises sector.

Key words: investment loans, working capital loans, micro-enterprises, economic conditions, industries, panel model

JEL codes: J13, J21, J22, I38

Rafał Balina https://orcid.org/0000-0001-6304-8149; Adam Zając https://orcid.org/0000-0002-8511-8117; Marta Idasz-Balina https://orcid.org/0000-0002-4129-8259;
✉ rafal_balina@sggw.edu.pl

INTRODUCTION

Micro, small and medium-sized enterprises (MSMEs) are the driving force of most countries in the world, contributing to their development [Secinaro et al. 2020, Manzoor et al. 2021], and they play a particularly important role in developing countries [Ndiaye et al. 2018]. In 2021, there were around 22.8 million MSMEs in the EU-27, accounting for 99.8% of all enterprises in the non-financial corporate sector [Muller et al. 2022]. In Poland, micro, small and medium-sized enterprises (MSMEs) account for more than 99% of all companies in operation, and among them, micro-enterprises (MEs) accounted for 96.6% of them at the end of 2021 [GUS 2021]. Previous research shows that these enterprises contribute to the economic development of individual countries in different ways. Among other things, they have a real share in generating their GDP [Ayyagari et al. 2007] and creating jobs in both rural and urban areas, as well as ensuring the desired sustainable development and innovation in the economy [Beck et al. 2015]. Importantly, micro, small and medium-sized enterprises are characterized by greater flexibility of operation in a changing environment than large enterprises [Iaroslav et al. 2022], and thus, they are crucial for the functioning of many dynamically changing economies, among others, due to the ease of introducing technological changes, changes in the revenue structure as well as efficiency in responding to new consumers' needs and preferences [Pilar et al. 2018]. Often, MSMEs are able to efficiently allocate their limited resources to search for market niches that large enterprises are not interested in. They counteract the exclusion of a part of society or create new markets [Tambunan 2008], and at the same time, they complement the offer of large enterprises. The MSME sector also contributes to regional development by spreading investments more evenly, including less developed regions [Taiwo et al. 2013]. By providing opportunities for self-employment and educating managers and low-skilled workers, micro, small and medium-sized enterprises contribute to a decrease in unemployment, limiting economic migration, as well as to a greater use of local resources and mobilization of local savings [Taiwo et al. 2013]. In the context of the entire economy, MSMEs are a complementary element in relation to large companies and the public sector through cooperation with these entities as subcontractors, suppliers or agents. In addition, these enterprises may have an advantage over large entities in terms of response to changing environmental conditions, innovation, and fast information flows [Eniola and Entebang 2015]. Also, in the case of crises, the MSME sector also suffers the effects more rapidly. An example of this is the MSME response to COVID-19. As the research shows, the COVID-19 pandemic caused a huge increase in the level of uncertainty, comparable to that observed during the global financial crisis of 2008–2009 [Czech et al. 2020].

The COVID-19 pandemic and the restrictions imposed by the government have caused significant effects on the Polish economy. The macroeconomic indices were observed to have declined in the second quarter of 2020, which coincided with the first lockdown. The economic downturn is evidenced by the analysis of the GDP dynamics, which in the second quarter of 2020 and in the subsequent quarters assumed negative values. The OECD experts point out that COVID-19 has caused adverse effects in many branches of the economy, and the impact of COVID-19 on various sectors of the economy was diversified [Szczepaniak et al. 2020]. COVID-19 has given rise to negative consequences, for instance, in the sector of small and medium-sized enterprises (SMEs). Businesses have experienced dramatic revenue losses. Some SMEs have taken steps to remain operational, for instance, shorter working time of employees, redundancies, suspending some business operations, or temporary closure of business. Some entrepreneurs, however, have been forced to go out of business [Warsame 2020]. Enterprises face such challenges as disruptions in logistic activities, lesser mobility of the staff, growing uncertainty about restrictions and a general decline in the economic potential of national economies. At the same time, the situation has led to an increase in MSMEs' demand for short- and medium-term financing.

Therefore, access to finance for MSMEs to operate and grow is an important issue. According to the literature, the activities of enterprises can be financed with capital from various sources. Assuming the source of capital origin as the division criterion, two main types of sources of financing enterprises are distinguished, i.e., internal and external financing [Abiodun Eniola

and Entebang 2015], and their selection depends on many factors [Forte et al. 2013], as the demand for capital and the availability of various sources of finance vary depending on the phases of the enterprise's life cycle [Berger and Udell 1998]. Many studies confirm the thesis that the basic source of financing for the sector of micro, small and medium-sized enterprises is equity [Piątkowski 2020]. This applies primarily to enterprises at an early stage of development [Huyghebaert and Van de Gucht 2007], and thus primarily micro-enterprises. In a time of economic slowdown, MSMEs begin to replace internal sources of financing with external ones, including investors, trade credit, and bank loans. A bank loan is one of the most popular forms of external financing of enterprises in Poland [Piątkowski 2020] and Europe [Klapper et al. 2002, Abdulsaleh and Worthington 2013, Forte et al. 2013]. Enterprises mainly use working capital and investment loans [Peel and Wilson 1996], which have different applications.

In this context, it is worth noting that the economic situation can be considered as changes in basic economic measures describing the condition of a given economy, such as GDP, interest rates, commodity price index, etc. Importantly, the available analyses confirm the existence of a relationship between the level of macroeconomic measures and the credit market [Calza et al. 2003]. For example, existing studies confirm the relationship between GDP and the level of interest rates and the demand and supply of bank loans [Jiménez et al. 2012], which translates into the value and number of loans granted [Awdeh 2016]. Other studies confirm the relationship between the interest rate on loans and the index of prices of consumer goods and services, and the number and value of loans granted. In addition, there are also analyses in which the authors try to determine the impact of macroeconomic factors on loan repayment [Castro 2013]. They show that the risk of loan default increases with a decrease in GDP and stock price indices, which is due to the fact that higher real GDP growth results in higher income, which has a positive effect on borrowers' ability to service their debt [Macháček et al. 2018]. The opposite situation occurs in the case of an economic slowdown, when the risk of loan default increases because borrowers' incomes decrease, and as a result, they have more problems with servicing their liabilities [Salas and Saurina 2002]. Subsequent studies determine the relationship between the unemployment rate and the share of non-performing loans, according to which the increase in the number of unemployed people reduces the borrowers' ability to service debt and increases the share of non-performing loans [Zeng 2012]. Some studies on the relationship between the level of inflation and the share of irregular loans indicate that as a result of inflation, credit liabilities become cheaper, which improves repayment [Dimitrios et al. 2016]. However, other conducted analyses indicate that the level of non-performing loans increases according to the inflation rate [Wang 2019]. This is probably due to the occurrence of inflation along with the economic slowdown or unemployment growth [Skarica 2014]. Another of the analyzed factors concerns the impact of public debt on the credit market, and in this case, some dependencies were noticed in the conducted research [Beck et al. 2015]. In summary, numerous studies confirm that the availability of loans has a positive impact on the size of GDP [Cappiello et al. 2010] and the economic situation.

Summing up, it can be said that indicators describing the economic situation have an impact on the credit market, which is confirmed by many international studies. However, there are no studies showing how the economic situation and the economic situation in individual industries affect the credit market for the sector of micro-enterprises. And as research shows, access to external financing is crucial for the functioning, survival and expansion of micro, small and medium-sized enterprises [Temelkov et al. 2018]. Therefore, the aim of the research was to find an answer to the question of whether and how economic indicators in manufacturing, construction, trade and services affect changes in the size of micro-enterprises related to the investment and working capital loan market in Poland. At the same time, taking into account the above, the following research hypotheses were formulated:

H_1 – The general level of the economic situation has a positive effect on the value of loans granted to micro-enterprises.

H_2 – The increase in the general level of the economic situation has a stronger impact on the increase in the demand for investment loans than on working capital loans among micro-enterprises.

H_3 – The increase in the value of loans granted to micro-enterprises depends mainly on the economic situation in the sector of industrial production and services.

RESEARCH METHODOLOGY

The use of dynamic panel models in economic research is gaining more and more supporters. Research conducted with the use of dynamic panel models concerns determining the determinants of economic growth (e.g., the Solow-Swan model) or estimating models based on the production function (Cobb-Douglas). Therefore, to assess the relationship between the studied factors, dynamic panel data models were used – econometric models estimated on the basis of panel data, where it is assumed that the dependent variable is affected, in addition to the explanatory variables, by lagged levels of the dependent variable and immeasurable constants over time and object-specific factors known as group effects [Bhattarai 2019].

The dynamic panel model has the following form [Arellano and Bond 1991]:

$$y_{it} = \gamma y_{i,t-1} + x_{it}^{T}\beta + u_{it} = \gamma y_{i,t-1} + x_{it}^{T}\beta + \alpha_i + \varepsilon_{i,t},$$

$$i = 1, \dots, N, t = 1, \dots, T$$

where, $\varepsilon_{i,t} \sim N(0, \sigma\varepsilon^2)$ for all i, t, α_i – group effect, random or non-random. Whereas if α_i is random, then $\alpha_i \sim N(0, \sigma\alpha^2)$, $[x_{kit}]_{\boldsymbol{Kx^1}}$ $\boldsymbol{s}$ is a vector of explanatory variables with $\boldsymbol{K}$ coordinates, β is a vector of parameters ($\boldsymbol{Kx1}$), the same for all i and t.

The estimation of dynamic models was carried out using the Generalized Method of Moments (GMM), which allows the estimation of model parameters directly from the conditions of the moments. In the literature on the subject, it is assumed that both the form and the number of moment conditions used during estimation depend on the assumptions made regarding the level of correlation between the variables and the components [Bhattarai 2019]. Assuming no autocorrelation of the random term, in the process of estimating the parameters of the models, the assumption of strict exogeneity of the variables can be made, which excludes a correlation with current values, with lagging values, as well as with future values. It is more restrictive than the alternative assumptions of weak exogeneity of variables (there is a correlation with current values, but there is not any with lagged values), and also from the assumption of endogeneity of variables (there is a correlation with current values and with lagged ones, but there is not any with future values). Structural parameters of dynamic panel models were estimated using the Generalized Method of Moments (GMM) [Arellanoand and Bond 1991, Blundell and Bond 1998].

The study with regard to data on the micro--enterprise loan market is based on monthly data from the Polish Credit Information Bureau (BIK), the main source of credit and economic information in Poland, which collects and provides data on individual customers and entrepreneurs. The data on the economic situation are based on the results of the economic situation survey conducted using the economic situation test method by the Central Statistical Office (GUS). The research conducted by the Central Statistical Office in the form of a survey is of a qualitative nature. Due to the simple methodology and relatively short form, it enables a more comprehensive assessment of the situation of the enterprise sector. In the study, using more detailed indicators describing the economic situation in individual sectors from the Central Statistical Office economic situation survey, the most important variables affecting the value and share of overdue loans in the micro-enterprise sector were identified.

Monthly data for the years 2019–2021, covering the period of the COVID-19 pandemic, were used for the analyses.

The following variables determining the level of the economic situation in Poland and the factors included in it were used in the research, in accordance with the methodology adopted by the Central Statistical Office [GUS 2022]:

- general synthetic indicator of the economic situation of the Central Statistical Office (SI),
- synthetic indicator of the economic situation in the industrial processing sector (SI_M),
- synthetic indicator of the economic situation in the construction sector (SI_C),
- synthetic indicator of the economic situation in the retail sector (SI_RT),

- synthetic indicator of the economic situation of the service sector (SI_S),
- current portfolio of domestic and foreign orders [state] in the industrial processing sector (C_M),
- current stock of finished products in the industrial processing sector (S_M),
- expected production in the industrial processing sector (EP_M),
- current portfolio of orders on the domestic and foreign market [state] in the construction sector (C_C),
- expected employment in the construction sector (EE_C),
- sales of goods in the last three months in the retail sector (SG_RT),
- current stock of goods in the retail sector (S_RT),
- the expected amount of goods sold in the retail sector (EQ_RT),
- general situation of the entity in the last three months in the service sector (GS_S),
- demand for services in the last three months in the service sector (D_S),
- expected demand in the services sector (ED_S).

Data on the economic situation were used to estimate the diversification of the demand for external financing in the form of investment and working capital loans of enterprises from the micro-enterprise sector. The estimation of the models was carried out on the basis of the defining data, which described the effective demand for ME loans, realized in the form of loan agreements:

- the value of launched investment loans granted to borrowers with the status of micro-entrepreneurs (PLN thousand) (S_KI_V),
- value of working capital loans granted to borrowers with the status of microentrepreneurs (PLN thousand) (S_KO_V),
- value of investment and working capital loans launched granted to borrowers with the status of micro-entrepreneurs (PLN thousand) (S_T_V).

Table 1 presents descriptive statistics characterizing the variables studied, while Table 2 contains correlation coefficients between the variables studied.

The results indicate the ascendancy of statistically significant relationships between the variables considered.

Table 1. Descriptive statistics

Specification	Average	Median	Minimum	Maximum	Standard Deviation	Standard Error
S_KI_V	341 560.10	331 418.74	156 182.95	538 381.84	90 268.61	15 044.77
S_KO_V	711 346.93	728 150.84	439 432.91	986 806.46	120 926.60	20 154.43
S_T_V	1 052 907.03	1 069 226.48	620 763.16	1 393 518.07	195 417.27	32 569.54
SI	95.07	102.30	50.00	107.80	14.92	2.49
SI_M	101.06	106.35	63.40	112.90	12.28	2.05
SI_C	104.77	105.35	74.00	116.80	10.01	1.67
SI_RT	94.53	101.60	42.30	112.20	16.88	2.81
SI_S	85.57	96.30	27.60	102.60	19.65	3.28
C_M	0.41	0.70	–2.60	1.70	1.06	0.18
S_M	0.75	0.70	–1.70	2.80	0.97	0.16
EP_M	–0.93	–0.70	–6.10	0.10	1.16	0.19
C_C	0.86	0.85	–0.70	1.90	0.76	0.13
EE_C	–0.16	–0.10	–3.60	0.70	0.80	0.13
SG_RT	–0.55	0.05	–5.20	0.80	1.48	0.25
S_RT	–0.04	–0.20	–2.60	3.00	1.17	0.19
EQ_RT	–0.62	–0.25	–6.90	0.90	1.67	0.28
SG_S	–1.10	–0.25	–5.80	0.20	1.60	0.27
D_S	–1.02	–0.20	–5.60	0.30	1.56	0.26
ED_S	–1.05	–0.50	–5.90	0.10	1.27	0.21

Source: own elaboration.

Interestingly, during the analyzed period, there was a positive relationship between demand and investment and working capital loans, which could indicate that micro--enterprises in difficult economic conditions tried to obtain funds in various ways to implement the projects they started. In the case of investment loans for micro-

Table 2. Correlation matrix

Specification	S_KI_V	S_KO_V	S_T_V	SI	SI_M	SI_C	SI_RT	SI_S	C_M	S_M	EP_M	C_C	EE_C	SG_RT	S_RT	EQ_RT	SG_S	D_S	ED_S
S_KI_V	1.000	0.706	0.899	0.724	0.730	0.599	0.711	0.706	0.659	0.573	0.616	0.559	0.568	0.642	0.515	0.654	0.690	0.683	0.673
S_KO_V	0.706	1.000	0.945	0.724	0.675	0.705	0.725	0.739	0.693	0.335	0.654	0.705	0.623	0.693	0.403	0.713	0.709	0.711	0.727
S_T_V	0.899	0.945	1.000	0.782	0.755	0.713	0.777	0.783	0.733	0.472	0.689	0.695	0.648	0.725	0.487	0.743	0.757	0.755	0.761
SI	0.724	0.724	0.782	1.000	0.981	0.918	0.972	0.990	0.956	0.637	0.873	0.835	0.888	0.923	0.662	0.877	0.972	0.971	0.933
SI_M	0.730	0.675	0.755	0.981	1.000	0.862	0.938	0.946	0.925	0.737	0.860	0.747	0.869	0.863	0.667	0.850	0.922	0.921	0.905
SI_C	0.599	0.705	0.713	0.918	0.862	1.000	0.878	0.929	0.928	0.325	0.884	0.937	0.944	0.874	0.416	0.882	0.900	0.897	0.912
SI_RT	0.711	0.725	0.777	0.972	0.938	0.878	1.000	0.969	0.884	0.586	0.882	0.783	0.866	0.922	0.733	0.891	0.944	0.940	0.937
SI_S	0.706	0.739	0.783	0.990	0.946	0.929	0.969	1.000	0.959	0.564	0.849	0.877	0.871	0.945	0.645	0.864	0.988	0.988	0.924
C_M	0.659	0.693	0.733	0.956	0.925	0.928	0.884	0.959	1.000	0.560	0.767	0.912	0.835	0.908	0.533	0.785	0.964	0.963	0.845
S_M	0.573	0.335	0.472	0.637	0.737	0.325	0.586	0.564	0.560	1.000	0.359	0.254	0.352	0.510	0.686	0.370	0.585	0.589	0.439
EP_M	0.616	0.654	0.689	0.873	0.860	0.884	0.882	0.849	0.767	0.359	1.000	0.691	0.965	0.749	0.486	0.953	0.771	0.767	0.964
C_C	0.559	0.705	0.695	0.835	0.747	0.937	0.783	0.877	0.912	0.254	0.691	1.000	0.770	0.859	0.322	0.753	0.879	0.878	0.781
EE_C	0.568	0.623	0.648	0.888	0.869	0.944	0.866	0.871	0.835	0.352	0.965	0.770	1.000	0.790	0.452	0.905	0.815	0.809	0.931
SG_RT	0.642	0.693	0.725	0.923	0.863	0.874	0.922	0.945	0.908	0.510	0.749	0.859	0.790	1.000	0.564	0.767	0.958	0.958	0.812
S_RT	0.515	0.403	0.487	0.662	0.667	0.416	0.733	0.645	0.533	0.686	0.486	0.322	0.452	0.564	1.000	0.428	0.660	0.650	0.548
EQ_RT	0.654	0.713	0.743	0.877	0.850	0.882	0.891	0.864	0.785	0.370	0.953	0.753	0.905	0.767	0.428	1.000	0.785	0.784	0.976
SG_S	0.690	0.709	0.757	0.972	0.922	0.900	0.944	0.988	0.964	0.585	0.771	0.879	0.815	0.958	0.660	0.785	1.000	0.999	0.857
D_S	0.683	0.711	0.755	0.971	0.921	0.897	0.940	0.988	0.963	0.589	0.767	0.878	0.809	0.958	0.650	0.784	0.999	1.000	0.857
ED_S	0.673	0.727	0.761	0.933	0.905	0.912	0.937	0.924	0.845	0.439	0.964	0.781	0.931	0.812	0.548	0.976	0.857	0.857	1.000

Source: own elaboration.

Table 3. Models of the value of launched investment and working capital loans granted for micro-enterprises depending on the general economic situation indicator

Specification	S_KI_V (model 1)		S_KO_V (model 1)		S_T_V (model 1)	
	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance
S_KI_V (t–1)	–0.122749	0.0465**	–	–	–	–
S_KO_V (t–1)	–	–	0.0581228	0.0419**	–	–
S_T_V (t–1)	–	–			0.0134885	0.08329*
SI	0.0172316	>0.0001***	0.00854119	>0.0001***	0.0108959	0.0000***

Significance level at: *10%, **5%, ***1%.
Source: own elaboration.

-enterprises, it was noted that the highest correlation coefficient occurred for the variable SI_M, which indicated the importance of economic concurrency in the manufacturing sector. For investment loans for micro-enterprises, the highest correlation coefficient was noted for the variable SI_S, which indicated the state of economic prosperity in the service sector. This indicates the crucial importance of these variables.

Results

Table 3 presents the results of the estimation of the model determining the value of financing for micro-enterprises launched by banks in Poland depending granted on the general synthetic index of the economic situation (SI). The research results indicate that regardless of the type of financing granted (S_KI_V – model 1; S_KO_V – model 1), the level of SI significantly affected the amount of support for these enterprises by banks. At the same time, SI influenced the change in the volume of granted investment loans more than twice as strongly (S_KI_V – model 1). The regression coefficient was 0.0172316 compared to the change in the volume of working capital loans granted (S_KO_V – model 1), and the regression coefficient was 0.00854119. The stronger impact of AI on investment loans could be due to the fact that working capital loans can perform various functions: in times of prosperous economy, they allow to increase revenues and improve results, while in times of economic downturn, they can be a kind of collateral enabling survival, protecting against loss of financial liquidity. As a result, the demand for this type of loan may be less sensitive to changes in the economic situation. These results allowed for a positive verification of Hypothesis 1 (H_1) and Hypothesis 2 (H_2). This may indicate that micro-enterprises make their demand for investment and current assets dependent on the state

Table 4. Models of the value of launched investment and working capital loans granted for micro-enterprises depending on industry indicators of the economic situation

Specification	S_KI_V (model 2)		S_KO_V (model 2)		S_T_V (model 2)	
	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance
S_KI_V (t–1)	–0.12546	0.28170	–	–	–	–
S_KO_V (t–1)	–	–	–0.09722	0.49760	–	–
S_T_V (t–1)	–	–	–	–	–0.07215	0.63380
SI_M	0.01114	0.0330**	–0.01076	0.0624*	–0.07215	0.63380
SI_C	–0.00534	0.50920	–0.00178	0.55760	–0.00354	0.51880
SI_RT	0.00003	0.98830	0.00535	0.0001***	0.00385	0.0087***
SI_S	0.00877	>0.0001***	0.01004	0.0158**	0.00919	0.0094***

Significance level at: *10%, **5%, ***1%.
Source: own elaboration.

of the economic situation, which significantly affects their functioning. This is confirmed by the results of the model developed for the total value of investment and working capital loans for micro-enterprises (S_T_V – model 1), in which, as in the partial models, the level of the general economic situation index was the same.

Table 4 estimates the value of launched investment and working capital loans granted for micro-enterprises, taking into account the economic situation in four main areas of business activity, i.e., industrial production (SI_M), construction (SI_C), retail sales (SI_RT) and services (SI_S). In the case of the value of investment loans granted, two factors determining the economic situation in the industrial production sector (SI_M) and services (SI_S) were significant, and both had a positive impact on the level of investment loans granted to micro-enterprises (S_KI_V – model 2). This could have been due to the fact that micro-enterprises most often operated in this area, and the improvement of the economic situation resulted in an increase in investments resulting from an increase in orders for their products and services. In addition, enterprises operating in the production and services sector have a higher share in the structure of fixed assets, which are financed with long-term capital, for example, in the form of investment loans. This is probably why, in times of prosperity in these sectors, the increase in corporate investment has a significant impact on the value of investment loans granted. In the model for S_KO_V (model 2), the levels of the economic situation in industrial production and services were crucial as well, but additionally, the situation in retail sales was important. This could be due to the fact that micro-enterprises, as a rule, when conducting their activities in a period of good market conditions, used working capital loans in order to maintain financial liquidity, but also to conduct current investments. A significant difference in the estimated models (S_KI_V – model 2, S_KO_V – model 2) was also the fact that in the case of S_KI_V (model 2) the economic situation in industrial production had a positive impact on the value of working capital loans granted, and in the

Table 5. Models of the value of launched investment and working capital loans granted for micro-enterprises depending on the factors determining the economic situation

Specification	S_KI_V (model 3)		S_KO_V (model 3)		S_T_V (model 3)	
	Coefficient	Significance	Coefficient	Significance	Coefficient	Significance
S_KI_V (t–1)	**–0.02889**	**0.08488***				
S_KO_V (t–1)			**–0.23262**	**0.083084 ***		
S_T_V (t–1)					**–0.11940**	**0.05435****
C_M	**13.52200**	**<0.0001*****	**16.70790**	**<0.0001*****	**15.72690**	**<0.0001*****
S_M	–0.00692	0.968	–0.15794	0.2716	–0.09400	0.5142
EP_M	–0.00621	0.9375	**0.05449**	**0.0154****	–0.03737	0.2103
C_C	–0.00424	0.984	–0.02349	0.8366	0.00602	0.9622
EE_C	**0.41380**	**0.0143****	0.02400	0.7384	**0.10926**	**0.052***
SG_RT	0.09882	0.5303	–0.06747	0.6417	–0.05328	0.6658
S_RT	–0.29085	0.1844	0.15564	0.3473	0.00411	0.9823
EQ_RT	0.08838	0.2793	**0.07061**	**0.0457****	**0.07620**	**0.0732***
GS_S	**0.22931**	**0.0604***	–0.05012	0.6613	0.03622	0.7407
D_S	–0.58809	0.1422	**–0.78282**	**0.0058*****	**–0.66942**	**0.0302****
ED_S	**0.85952**	**0.0141****	**0.83305**	**0.0032*****	**0.78528**	**0.0043*****

Significance level at: *10%, **5%, ***1%.

Source: own elaboration.

case of the S_KO_V (model 2) model it had a negative impact, which could mean that the development of the industrial production sector is financed mainly with investment loans and working capital loans, and also that working capital loans are treated by this sector as a form of securing business continuity and liquidity, which explains the decrease in their value in times of economic prosperity and their increase in times of economic downturn in this sector. The importance of the economic situation in the retail and services sector is indicated by the aggregated model of the value of launched loans granted for micro-enterprises (S_T_V – model 2), where these factors (SI_RT, SI_S) were statistically significant. These results confirm hypothesis 3 (H_3).

Table 5 estimates models for the value of launched investment and working capital loans granted, taking into account the elements that make up the level of the economic situation. According to the calculations, the value of launched investment loans was affected by four factors, i.e., C_M, EE_C, GS_S and ED_S. On the other hand, the value of working capital loans was affected by the following factors of the economic situation: C_M, EP_M, EQ_RT, D_S and ED_S. In both cases, the current portfolio of domestic and foreign orders in the industrial processing sector (C_M) and the expected demand in the services sector (ED_S) were important, which indicates that micro-entrepreneurs, to a large extent, analyzing the demand for investment and working capital loans, take into account the economic situation regarding orders and demand for goods and services, as well as predictions in this regard. It is worth emphasizing the different specificity of factors in individual sectors, which most likely result from their characteristics and market conditions. In the case of processing, most likely due to high competition, micro-enterprises report demand for an investment loan when the number of orders is sufficient. In the case of the construction or services sector, micro-enterprises make these decisions earlier on the basis of predictions, and this may be due to the greater demand for manufactured goods or services. In the case of services, this may also be due to a shorter production cycle, as well as the fact that micro-enterprises in this sector compete more with each other in terms of service delivery time. In the case of the value of investment loans granted to micro-enterprises, the estimated model additionally indicated that the value of expected employment in the construction sector (EE_C) and the general situation of the entity in the last three months in the services sector (GC_S) were significant, which indicates that these enterprises tried to predict long-term behavior in the economy and development opportunities. The importance of the factor related to the expected employment in the construction sector may mean that in this sector, micro-enterprises decide to invest only when they have evidence of the lack of a significant barrier preventing the operation of the enterprise. In the model determining the value of working capital loans granted to micro-entrepreneurs, apart from C_M and ED_S, there are variables defining the expected production in the industrial processing sector (EP_M), the expected amount of goods sold in the retail sales sector and the demand for services in the last three months in the services sector (D_S). The significance of these factors is consistent with the use and characteristics of working capital loans. This indicates that micro-enterprises were guided by the current and near-term situation in the services and processing market when making decisions on financing their operations with a working capital loan. The model developed for the total value of loans granted to micro-enterprises indicated the similar importance of factors determining the economic situation in individual industries, as was the case in the models developed for investment and working capital loans.

CONCLUSIONS

The conducted research showed that economic factors play a significant role in shaping the demand for investment and working capital loans in the micro--enterprise sector, which stays in line with research done by Peel and Wilson [1996] and Cappiello et al. [2010] but the impact of the economic situation was greater in the case of investment loans than working capital loans. This may partly result from the two functions of working capital loans: in times of economic prosperity, allowing to raise capital to increase the scale of operations and generate additional income, and in times of economic

downturn as a kind of collateral enabling survival and maintaining liquidity. The research results also indicate that in periods of economic prosperity, micro-enterprises are more likely to take out investment loans than in periods of economic downturn, which confirms the results achieved by Temelkow [2018]. In addition, research shows that the propensity of micro-enterprises to take out working capital loans is more dependent on their current situation and expectations regarding the demand for products and services. The research revealed differences in the characteristics of the factors significantly influencing the demand for credit, depending on the sector to which the indicator is concerned. Banks and other financial institutions can use the results of the conducted research to predict the demand for credit for micro-enterprises, which will contribute to the modification of pricing and risk policies and, as a result, the improvement of financial ratios. Verifying whether the economic indicators relevant to the level of demand for investment and working capital loans among Polish micro-enterprises are different at the level of economic activity departments operating within the sector will be a challenge for future research. In addition, in the longer term, we would like to assess the impact of changes in selected economic indicators on the share of non-serviced loans in total loans granted to micro-enterprises.

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KONIUNKTURALNE UWARUNKOWANIA ZAPOTRZEBOWANIA NA KREDYTY INWESTYCYJNE I OBROTOWE DLA MIKROPRZEDSIĘBIORSTW – BADANIA DLA POLSKI W CZASIE COVID-19

STRESZCZENIE

Cel: Celem badań było znalezienie odpowiedzi na pytanie, czy i w jaki sposób wskaźniki koniunktury gospodarczej w przetwórstwie przemysłowym, budownictwie, handlu i usługach odzwierciedlają zmiany wielkości związanych z rynkiem kredytów inwestycyjnych i obrotowych wśród mikroprzedsiębiorstw. **Metody:** W badaniu wykorzystano miesięczne dane dotyczące kredytów inwestycyjnych i obrotowych oraz dane dotyczące koniunktury gospodarczej. Do analiz wykorzystano dane za lata 2019–2021 obejmujące okres pandemii COVID-19. Do estymacji modeli dynamicznych wykorzystano uogólnioną metodę momentów (GMM). **Wyniki:** Przeprowadzone badania wykazały, że czynniki ekonomiczne charakteryzujące koniunkturę gospodarczą odgrywają istotną rolę w kształtowaniu popytu na kredyty inwestycyjne i obrotowe w sektorze mikroprzedsiębiorstw, przy czym wyniki przeprowadzonych badań wykazały, że wpływ koniunktury gospodarczej na popyt na kredyty w sektorze mikroprzedsiębiorstw był większy w przypadku kredytów inwestycyjnych niż obrotowych. Co ważne w okresach dobrej koniunktury gospodarczej mikroprzedsiębiorstwa chętniej zaciągają kredyty inwestycyjne niż w okresach dekoniunktury, co wskazuje na to, że skłonność mikroprzedsiębiorstw do zaciągania kredytów obrotowych jest uzależniona od ich aktualnej sytuacji i oczekiwań co do kształtowania się popytu na ich produkty i usługi. **Wnioski:** Badania wykazały, że w sekatorze mikroprzedsiębiorstw występuje istotne zróżnicowanie czynników wpływających na popyt na kredyt inwestycyjne i obrotowe w zależności od branży. Z badań wynika, że dostęp do finansowania zewnętrznego jest kluczowy dla funkcjonowania, przetrwania i ekspansji mikroprzedsiębiorstw. Przeprowadzone badania umożliwiły wypełnienie luki literaturowej, wskazując zależność sytuacji gospodarczej w poszczególnych branżach na rynek kredytów inwestycyjnych i obrotowych w sektorze mikroprzedsiębiorstw.

Słowa kluczowe: kredyty inwestycyjne, kredyty obrotowe, mikroprzedsiębiorstwa, warunki ekonomiczne, branże, model panelowy

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EDUCATION AND THE ECONOMIC SITUATION OF HOUSEHOLDS IN THE SUBCARPATHIAN VOIVODESHIP

Piotr Cyrek, Magdalena Cyrek ✉

University of Rzeszów, Poland

ABSTRACT

Aim: This paper attempts to diagnose the economic situation of households in the Subcarpathian Voivodeship in the years 2014–2022, and to determine the importance of education as a differentiating factor. **Methods:** For this purpose, an analysis was conducted of the results of questionnaire studies conducted in five consecutive periods, which rendered it possible to compare the situation over time. The data are sufficient to present a general account of the economic situation, as well as its 8 different aspects. Variance analysis allowed for the statistical verification of the significance of education from the perspective of the economic situation of households. **Results:** The results obtained indicate that better education improves the economic situation of a household, although the differences disappear with general economic change. The research indicates that the least educated are exposed to the most socioeconomic risk, which manifests in difficulties in meeting their most basic subsistence needs. Simultaneously, the economic situation of those with the highest human capital is the most stable, which proves that higher education is a factor that improves the resilience of one's living standards to external disruption. **Conclusions:** Generally, it is possible to conclude that education remains a factor in strengthening households' economic security. The research is original in that it fills an empirical gap related to verifying the existence of differences in material living standards due to educational attainment by way of using dynamic comparisons to diagnose the situation in a peripheral region of Poland.

Key words: education, economic situation, households
JEL codes: D14, D19, D31, I26, I31, R29.

INTRODUCTION

A household consists of a group of individuals co-managing their assets and budget for the purpose of satisfying the (individual and group) needs of all its members [Bywalec 2012, p. 16, Orszulak-Dudkowska 2019, p. 38 as cited in: Utzig et al. 2022, pp. 11–12]. Households constitute an important category of economic entities, and their condition is one of the primary determinants of the general state of the economy.

The economic condition (situation) of a household is typically assessed from the perspective of its financial situation, determined by its income, savings, debt, but also assets (possession of durable goods and housing) and consumption (expenses) [Dudek and Konat 2022, Gaweł-Luty 2022, p. 169, Kalinowski et al. 2022, Zbyrad 2022, p. 65, Korzeniowska et al. 2023, p. 7]. Assessed subjectively, the economic situation is also referred to as financial well-being [Duczkowski and Słowik 2022, p. 42]. The economic situation also has a fundamental impact on economic security, which is contingent upon employment stability, income, the ability to generate savings and the security of personal finances [Kosowski and Kułakowska 2022, p. 333].

Piotr Cyrek, https://orcid.org/0000-0002-8306-1612; Magdalena Cyrek, https://orcid.org/0000-0001-5020-9273,

✉ mcyrek@ur.edu.pl

Analyzed more broadly, the economic situation of a household is closely related to the economic aspects of quality of life, defined as living standards or life level and pertaining to the socioeconomic conditions of functioning, in particular, the degree to which material needs are being met [Gaweł-Luty 2022, p. 164, 169]. In the literature, living standards are most frequently defined as the degree to which material and fundamental human needs are being met, while the quality of life reflects the general well-being encompassing one's satisfaction with life, freedom of choice and self-realization, and is thus a subjective category [Dąbrowa 2011, Petrovska and Pantyley 2014, Kałamucka 2017 as cited in: Petrovska and Pantyley 2022, pp. 77–78, Skórska 2022, p. 9].

The economic situation of a household and its market and consumer behavior is influenced by a series of factors that define the household's demographic profile – educational attainment being one of the most significant ones [Adamczyk 2002 as cited in: Utzig et al. 2022, p. 19]. The role of educational attainment in influencing the economic situation of a household is conceptually defined by the human capital theory [Majchrowska and Roszkowska 2013, Jabłoński 2021], and has been widely verified empirically. It has been demonstrated that educational attainment determines an individual's ability to join the workforce, thus determining their living standards. Numerous studies indicate that individuals who are better educated are more likely to find work, and their salaries and income are higher [King 1990, Callander et al. 2012, p. 8, Wałęga 2012, Lavrinovicha et al. 2015, Piekutowski 2020, p. 26, Sztyber 2021, p. 19, Stasiak 2022, p. 97], and that preparing students for work becomes the primary goal of education [Jeran 2016, p. 52]. Educational attainment does not only impact the level of salaries, but also the rate of return on education [Majchrowska and Roszkowska 2013, Psacharopoulos and Patrinos 2018]. In addition, the impact of human capital on a salary is considered to be the main factor determining social status [Domański 2020, p. 289]. Both education and income are also used to reflect the objective socioeconomic position of individuals [Lindberg et al. 2022]. Moreover, education determines individual happiness, and the impact of education on happiness can also be mediated by income as an intermediary mechanism [Yang et al. 2022]. Higher education significantly reduces the risk of material and social deprivation [Fabrizi et al. 2023], and better education reduces poverty [Spada et al. 2023]. In addition, it has been observed that it is not only the economic situation, but also social participation, values, lifestyle and quality of life that change with the level of educational attainment [Piekutowski 2020].

Although positive effects of education on living standards have been identified, numerous studies indicate the existence of diminishing returns from higher education in Poland [Majchrowska and Roszkowska 2013], which may be connected to what is known as the overeducation effect and the replacement of the traditional criterion of formal education by new indicators of educational achievement [Domański 2020, s. 291]. As the average level of education in Polish households increases [Utzig et al. 2022, p. 24], it is to be expected that, similar to more developed countries, changes in the level of educational attainment sufficient to achieve a decent standard of living will also change [Callander et al. 2012, p. 18]. Similar problems are also diagnosed in other economies. Turčínková and Stávková [2012], concerning the income situation of households in the Czech Republic, point out that although the most vulnerable group comprises households with primary education or no education, a higher level of education is no guarantee of a lower risk of poverty and more and more attention should be paid to the applicability of university graduates in practice. Klein [2015] explains the widening unemployment gap between the low-educated and all other education groups in Germany by worsening macroeconomic conditions rather than structural crowding out, which proves the necessity of being educated for employability during economic downturns.

The goal of the study is to diagnose the economic situation of households making purchases from retail outlets in the Subcarpathian Voivodeship from 2014 to 2022, and to determine the significance of educational attainment as a differentiating factor. Based on previous research, it is assumed that increases in education should improve material living standards, although this influence may change over time due to increasing access to higher education.

MATERIALS AND METHODS

The results of five studies conducted by the author in 2014, 2016, 2018, 2020 and 2022 were compiled for the purpose of the study. The research instrument was a questionnaire comprising, in addition to those presented in the paper, numerous other closed, semi-open and open questions pertaining to the views and behavior of retail clients. The data were collected in randomly selected localities and retail outlets in the Subcarpathian Voivodeship. The selection of respondents was made in accordance with the principle of conducting direct interviews with clients in numerically repeated intervals until the moment 10 respondents were interviewed in a given outlet. Respondents were both rural residents (with a share ranging from 35.6 to 54.5%) and urban ones (from 45.5 to 64.4%), of which 31 to 52.8% were residents of Rzeszów – the capital of the voivodeship. The final number of analyzed questionnaires was also determined by the completeness of the data acquired. Table 1 presents the properties of the samples from the years 2014–2022.

For the purpose of conducting a comparative analysis of the results of all studies, the same method was used every time when selecting the sample, research instrument and research technique. The studies were conducted exclusively in the Subcarpathian Voivodeship, and thus reflect regional characteristics, which means that the results obtained cannot be extrapolated to the entire population of Poland. However, despite the limited potential for generalizations, the studies can be used to compare changes over time and determine differences among households with different demographic profiles, including their level of educational attainment.

The responses acquired as part of the questionnaire studies were used to arrive at a general assessment of the economic situation of the households, which is based on responses pertaining to specific variables, i.e.:

X_1 – changes in the consumption of food products (increase – positive values/decline – negative values),

X_2 – changes in clothing, footwear and cosmetics purchases (increase – positive values/decline – negative values),

X_3 – changes in durable goods purchases (increase – positive values/decline – negative values),

X_4 – changes in luxury goods purchases (increase – positive values/decline – negative values),

X_5 – taking out loans (negative values) vs increase in the amount of disposable financial resources (positive values),

X_6 – an increased propensity to save (negative values)/ spend (positive values),

X_7 – changes in housing standards (improvement – positive values/decline – negative values),

X_8 – living near the poverty line (negative values) vs being well-off (positive values).

Respondents described their situation with respect to these categories on a scale of –3 to 3, and the arithmetic average of every question was used to assess the results. When the value was negative, it

Table 1. Sample size and structure

Specification	2014	2016	2018	2020	2022
Total respondents	787	611	250	391	353
Primary	129	109	38	81	52
Secondary	368	245	105	184	167
Higher	290	257	107	126	134
Share of the sample (%)	**2014**	**2016**	**2018**	**2020**	**2022**
Total respondents	100.0	100.0	100.0	100.0	100.0
Primary	16.4	17.8	15.2	20.7	14.7
Secondary	46.8	40.1	42.0	47.1	47.3
Higher	36.8	42.1	42.8	32.2	38.0

Source: own research.

adopted the character of a destimulant, and when the value was positive, it was a stimulant. In addition, a general assessment of the respondents' economic situation was conducted by calculating the average of the results for all 8 questions, which is a typical taxonomic solution.

The results are presented jointly and grouped by education, with three groups being defined, i.e., primary education (including middle school, primary school and lower, as well as primary vocational education), secondary education (including secondary vocational education, general secondary and post-secondary) and higher education (including first-cycle, second-cycle and other types of higher education). For the purpose of determining the existence of differences between these groups, a one-way analysis of variance was conducted with a significance of 0.05. However, the statistical results must be treated cautiously as the compared groups were not equally numerous. Nevertheless, they shed some light on possible differences connected with educational attainment.

RESULTS AND DISCUSSION

Educational attainment as a determining factor of the individual economic situation in Poland

Educational attainment is a factor that has a noticeable impact on the economic situation of Polish households. In particular, the status of individuals possessing higher education is, in numerous respects, better compared to other social groups. This is reflected in their position in the labor market, where individuals possessing higher education are more economically active, find employment easier and remain unemployed less frequently. The least educated individuals find themselves in the opposite situation. These differences persist throughout the entire period of analysis, i.e., from 2014 to 2022 (Table 2).

Similarly, the income of individuals possessing a high human capital was higher than in the general population, although this advantage declined over time. At the same time, the mean and median income of the least educated respondents was lower, but the difference also decreased over time (Table 3). These data indicate that higher education had

Table 2. Economic activity by education level in Poland in 2014–2022

Educational attainment	2014	2015	2016	2017	2018	2019	2020	2021	2022
Economic activity rate (%)									
Primary	41.5	41.2	40.5	40.5	39.9	39.2	39.1	40.4	39.9
Secondary	60.5	59.8	60.2	59.8	59.3	58.8	58.0	60.0	59.6
Higher	80.3	80.4	80.4	80.1	80.4	80.2	79.8	81.5	81.3
Employment rate (%)									
Primary	36.4	36.8	36.8	37.5	37.6	37.4	37.5	38.6	38.1
Secondary	54.8	55.1	56.4	56.8	56.8	56.7	55.9	58.1	57.6
Higher	76.5	77.2	77.8	78.2	78.8	78.6	78.2	80.3	80.3
Unemployment rate (%)									
Primary	12.5	10.7	9.0	7.4	5.6	4.6	4.3	4.3	4.6
Secondary	9.5	7.8	6.3	5.1	4.2	3.5	3.6	3.3	3.4
Higher	4.7	4.0	3.3	2.4	2.0	2.0	1.9	1.4	1.3

secondary: secondary vocational, general secondary and post-secondary; primary: primary vocational and middle school, primary and lower.

Source: [GUS 2022a, 2023, GUS and BDL 2023a]..

Table 3. Relative income by educational attainment level in Poland in 2014–2022

Educational attainment	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean equivalized net income as a percentage of mean income in the general population (%)									
Primary	66.6	66.8	68.6	70.2	70.8	70.7	71.1	72.5	73.5
Secondary	89.7	89.6	88.8	88.9	90.0	89.6	89.0	89.0	88.3
Higher	143.6	143.3	141.1	139.7	135.3	135.5	132.6	129.7	128.1
Median equivalized net income as a percentage of median income in the general population (%)									
Primary	70.8	69.0	71.1	74.0	74.2	74.4	72.2	74.5	77.1
Secondary	93.7	93.5	92.6	93.3	93.1	93.0	91.3	91.7	91.8
Higher	146.2	142.0	143.1	138.2	132.3	133.4	129.3	128.2	125.6

primary – levels 0–2, secondary – levels 3–4, higher – levels 5–8 according to ISCED2011

Source: [Eurostat 2023a, b].

progressively less impact on the improvement of the economic situation of individuals. The rapid pace of economic change necessitates constant adaptation and acquiring new skills, including those outside of the formal education system. Higher education provides a solid base for this, although it is not the sole determining factor with regard to earning an above-average income.

As a result of their favorable position in the labor market and relatively high income, individuals possessing higher education are more resilient to various socioeconomic risks. The percentage of individuals at risk

Table 4. Socioeconomic risk by educational attainment level in Poland in 2014–2022

Educational attainment	2014	2015	2016	2017	2018	2019	2020	2021	2022
At risk of poverty rate (%)									
Primary	35.6	37.3	36.4	29.7	31.5	29.5	33.0	28.4	26.6
Secondary	17.9	19.0	19.4	17.9	17.1	17.4	16.7	16.8	16.5
Higher	4.4	5.3	5.3	5.2	4.8	6.0	5.1	5.1	4.9
Material and social deprivation rate (%)									
Primary	32.3	27.3	22.2	20.9	18.6	18.0	13.2	13.1	12.7
Secondary	21.5	16.6	12.6	12.7	10.6	8.9	7.1	7.5	7.4
Higher	6.8	4.6	2.9	3.3	2.7	2.1	1.7	1.8	2.0
Persons living in households with very low work intensity (%)									
Primary	17.9	18.2	16.4	17.4	17.9	16.4	16.9	16.7	16.0
Secondary	8.7	8.4	8.3	7.4	7.0	6.0	5.5	5.5	4.9
Higher	2.9	2.9	2.0	1.4	2.0	1.7	1.5	1.7	1.4

primary – levels 0–2, secondary – levels 3–4, higher – levels 5–8 according to ISCED2011

Source: [Eurostat 2023c, d, e].

of poverty is much lower in this group. Situations where a household is incapable of meeting its essential needs due to material reasons are rare. The percentage of individuals being part of households with a very low work intensity is also relatively low. The aforementioned risks primarily affect the least educated respondents (Table 4).

Changes in the economic situation of households in the Subcarpathian Voivodeship in the years 2014–2022 – results of the author's own research

The Subcarpathian Voivodeship is one of the poorest Polish regions with the disposable gross incomes per capita reaching about 3/4 of its level for Poland (76.3% in 2014 and 78.6% in 2020) [GUS, BDL 2021c] and less favorable labor market indicators such as the unemployment rate, which was 15.3% in the last quarter of 2014 (compared to 8.3% for Poland) and 5.0% (compared to 2.9%) in the last quarter of 2022 [GUS 2021]. However, in this region, the position of the highly educated in the labor market is much more favorable than the others. Either the economic activity or the employment rates are higher for the group with a higher level of human capital (Table 5).

The households from the Subcarpathian Voivodeship analyzed throughout the entire research period assessed their economic situation relatively favorably, although cautiously so (all synthetic measures are positive, although close to 0 – Table 6). Their assessment was increasingly favorable from 2014 to 2018, which co-occurred with an economic upturn in the country. A similar, positive correlation between the acceleration of economic growth of the domestic economy in 2015 and 2016 and the improvement of the financial situation of families in Poland has been pointed out by Wereda and Prokopowicz [2017, p. 254]. Research conducted by Statistics Poland (GUS) indicated that in 2015 in Poland 69.3% of respondents were satisfied and 9.1% were very satisfied with life, 51.6% expressed positive and 8.3% very positive opinions about their professional situation (character of work, work time, salary), while 52.5% were satisfied and 4.9% very satisfied with their material living conditions. Only the financial situation was assessed more critically – every third respondent was satisfied with it, and every 28th was very satisfied [GUS 2015b]. Moreover, research by Statistics Poland (GUS) about the subjective evaluation of the material situation of households shows a steady trend of improvement, as in 2014, 8.6% of respondents assessed it as very good and 18.5% as rather good [GUS 2015a, p. 247], in 2018 the shares were 20.9 and 23.1%, respectively [GUS 2019, p. 259]; in 2020, 25.3% of respondents declared it as good and 26.4% as a rather good situation [GUS 2021, p. 267] and in 2021 it was 25.9 and 27.1%, respectively [GUS 2022b, p. 179].

However, in the presented research conducted in the Subcarpathian Voivodeship after the 2018 peak, the eco-

Table 5. Economic activity by education level in the Subcarpathian Voivodeship in 2014–2022

Educational attainment	2014	2015	2016	2017	2018	2019	2020	2021	2022
Economic activity rate (%)									
Primary	40.9	40.1	40.8	40.6	38.7	37.3	37.9	35.1	32.9
Secondary	60.4	60.3	61.3	61.4	60.0	57.6	56.2	57.3	55.9
Higher	80.1	78.8	80.1	80.1	78.9	80.4	80.5	80.4	81.7
Employment rate (%)									
Primary	33.8	34.9	35.5	36.0	35.4	34.9	35.7	33.1	30.0
Secondary	51.0	51.7	55.5	55.6	55.3	54.4	54.0	55.5	53.1
Higher	74.2	73.9	75.4	76.7	76.1	77.9	77.5	78.5	80.1

secondary: secondary vocational, general secondary and post-secondary; primary: primary vocational and middle school, primary and lower

Source: [GUS 2022a, 2023, GUS and BDL 2023a].

nomic situation of households appeared less optimistic. The lowest synthetic measure was observed in 2022, undoubtedly impacted by multifaceted crises such as the pandemic, increased inflation and the Russian invasion of Ukraine. It suggests that the region appears to be more vulnerable to downturns and external tensions.

However, the assessments are not homogeneous with regard to the various aspects of the economic situation. Throughout almost the entire period of analysis (with the exception of 2018), households attempted to increase their savings to protect themselves from a potential downturn. This caution was greatest in the most difficult year – 2022. In addition, except for 2018, households limited their purchases of luxury goods, whose consumption is the most affected by changes in income levels. In addition, durable goods purchases were also lower in 2022, which is an important indicator of a decline in the economic situation. In the remaining aspects, the assessments of the economic situation were favorable, which indicates that, despite major changes in the economy, household economic security was not at risk. These observations are also confirmed by the most favorable assessments of living standards, which were assessed as well-off significantly more frequently than near the poverty line, as well as the assessment of housing standards, as deprivation in this respect would be a strong indicator of economic difficulty. All of these indicators also demonstrate that the economic peak was in 2018. Their relative levels illustrate typical reactions aimed at maintaining a certain living standard, including increased thrift during an economic downturn, with the greatest restrictions put on luxury goods purchases, followed by durables.

Multidimensional research on the economic situation of households in Poland for 2009–2019 conducted by Kozak and Mrówczyńska-Kamińska [2022] also reflected its general improvement. However, the authors perceived some differences between the income or expenditure situation of households and their asset situation, which confirms the diversified tendencies concerning specific aspects of the economic situation identified in this study for Subcarpathian citizens.

Differences in the economic situation of households with different education levels – results of the author's own research

Assessments of the economic situation of the respondents' own households differed by educational attainment level (Table 7). The economic situation was assessed unfavorably primarily by individuals with primary education. Such households assessed their situation unfavorably in 2014, 2016 and 2022, i.e., during periods of general economic downturn. In 2022, generally negative assessments expressed by the synthetic measure

Table 6. Household economic situation characteristics

Specification	2014	2016	2018	2020	2022	Average by year
Decline – / increase + in the consumption of food products	0.20	0.20	0.40	0.26	0.25	0.2620
Decline – / increase + in clothing purchases	0.15	0.24	0.55	0.37	0.01	0.2640
Decline – / increase + in durable goods purchases	0.04	0.00	0.30	0.21	–0.12	0.0860
Decline – / increase + in luxury goods purchases	–0.33	–0.25	0.02	–0.04	–0.49	-0.2180
Taking out loans – / generating savings +	0.09	0.08	0.45	0.30	0.12	0.2080
Propensity to save – / spend +	–0.39	–0.26	0.16	–0.05	–0.61	-0.2300
Decline – / improvement + in housing standards	0.31	0.46	0.60	0.69	0.36	0.4840
Living near the poverty line – / being well–off +	0.54	0.53	0.75	0.74	0.51	0.6140
Synthetic measure	0.0763	0.1250	0.4038	0.3100	0.0038	

The values were calculated as the arithmetic average of responses on a scale of –3 to 3, where 0 – no opinion, 3 – I strongly agree.

Source: own research.

Table 7. Household economic situation metrics by respondent educational attainment level

Specification	2014			2016			2018			2020			2022		
	Primary	Secondary	Higher	Primary	Secondary	Higher	Primary	Secondary	Higher	Primary	Secondary	Higher	Primary	Secondary	Higher
Decline – / increase + in the consumption of food products	–0.08	0.16	0.37	–0.01	0.12	0.37	0.37	0.35	0.47	–0.06	0.35	0.32	0.35	0.34	0.12
Decline – / increase + in clothing purchases	–0.04	0.09	0.30	0.11	0.13	0.39	0.53	0.56	0.55	0.10	0.41	0.48	–0.17	0.05	0.03
Decline – / increase + in durable goods purchases	–0.18	0.01	0.17	–0.09	–0.13	0.16	0.08	0.34	0.35	0.01	0.31	0.20	–0.29	–0.10	–0.09
Decline – / increase + in luxury goods purchases	–0.55	–0.34	–0.21	–0.40	–0.35	–0.09	–0.08	0.15	–0.07	–0.41	0.04	0.08	–0.62	–0.51	–0.42
Taking out loans – / generating savings +	–0.11	0.12	0.13	–0.01	0.08	0.12	0.39	0.56	0.36	0.07	0.30	0.43	–0.02	0.04	0.28
Propensity to save – / spend +	–0.53	–0.48	–0.22	–0.29	–0.32	–0.18	0.16	0.10	0.21	–0.26	0.07	–0.09	–0.54	–0.69	–0.54
Decline – / improvement + in housing standards	0.18	0.26	0.43	0.40	0.38	0.56	0.68	0.66	0.52	0.27	0.81	0.78	0.21	0.37	0.40
Living near the poverty line – / being well–off +	0.36	0.48	0.68	0.21	0.60	0.58	0.61	0.89	0.67	0.36	0.85	0.83	0.21	0.45	0.70
Synthetic measure	–0.1188	0.0375	0.2063	–0.0100	0.0638	0.2388	0.3425	0.4513	0.3825	0.0100	0.3925	0.3788	–0.1088	–0.0062	0.0600

The values were calculated as the arithmetic average of responses on a scale of –3 to 3, where 0 – no opinion, 3 – I strongly agree.

Source: own research.

were also observed in households possessing secondary education, which highlights the extent of disruption during this period. At the same time, no group assessed their economic situation unfavorably in 2018 and 2020, as indicated by the positive synthetic measures.

Despite the vulnerability to negative economic phenomena of individuals possessing primary education, it should be noted that such individuals did not live in poverty or observe a decline in their housing standards in any of the analyzed periods. In the most difficult periods, they focused on limiting their luxury goods purchases, and declared being more thrifty. Thus, the group's behavior was in line with the general trend affecting all households.

On the other hand, individuals with the highest level of educational attainment assessed their economic situation as the highest most frequently. During unfavorable periods, the group declared increased tendencies to save money and limit luxury goods purchases. Interestingly, in the favorable year 2018, individuals possessing higher education also opted to limit luxury goods purchases, which may reflect a relatively high level of saturation with such goods. In addition, in 2020, they declared an increase in their propensity to save money, which may be a result of earning a higher income, thus allowing for saving and being able to quickly anticipate the crisis phenomena related to the pandemic. In the difficult year 2022, on the other hand, the group declared an increase in disposable financial resources much more frequently than the remaining groups, which indicates that such individuals were the least affected by the negative consequences of a general economic downturn. The synthetic measures of the economic situation of individuals with the highest human capital also remain the most stable over time. It was the only group that assessed its situation favorably in 2022.

Individuals possessing secondary education were the most affected by the upturn of 2018 and 2020, as in those years, the synthetic measures of their economic situations were the highest out of all groups. At the same time, variance in their living standards over time was higher compared to individuals possessing higher education, and similar to those possessing primary education (although their assessments were higher on average compared to the primary education group).

A general comparison of the economic situation of individuals by education level confirms that, as the education level increases, so does the favorability of assessment. However, the advantage of those possessing the best education primarily consists in resilience, and disappears during periods of economic upturn, which favored those with secondary education (most likely due to the positive impact of professional skills).

A one-way variance analysis was conducted for the purpose of verifying the significance of the difference in household economic situation assessments among groups with different educational attainment levels (Table 8).

Table 8. Variance analysis results for differences between educational attainment levels (*p* values)

Specification	2014	2016	2018	2020	2022
Decline – / increase + in the consumption of food products	**0.0047**	**0.0247**	0.8086	0.0663	0.2959
Decline – / increase + in clothing purchases	**0.0453**	0.0929	0.9911	0.1755	0.5742
Decline – / increase + in durable goods purchases	0.0605	0.0595	0.5095	0.2702	0.5528
Decline – / increase + in luxury goods purchases	0.1033	0.0827	0.4341	**0.0281**	0.6637
Taking out loans – / generating savings +	0.1500	0.6750	0.4582	0.1699	0.1303
Propensity to save – / spend +	**0.0391**	0.5664	0.8523	0.2640	0.6117
Decline – / improvement + in housing standards	0.1046	0.1884	0.6726	**0.0121**	0.5715
Living near the poverty line – / being well-off +	**0.0158**	**0.0078**	0.2739	**0.0131**	**0.0275**
Synthetic measure	**0.0029**	**0.0240**	0.7367	**0.0044**	0.3945

p values in bold denote statistically significant differences

Source: own research.

The differences in the synthetic assessment of household economic situations by education level proved to be significant in the case of 2014, 2016 and 2020. The test did not confirm the significance of these differences in 2018 – the year of the economic upturn, and in 2022 – a year of crises. It can thus be concluded that fluctuations in the general situation blur previously existing, traditional differences between individual education groups. During an upturn, every group experiences an improvement in their situation, with the most impactful changes occurring in groups with lower resources of human capital.

Educational attainment has been demonstrated to be a differentiating factor only in the case of selected aspects of a household's economic situation. Significant differences with regard to durables purchases, taking out loans and gathering disposable financial resources were not identified in any of the analyzed periods. In relation to clothing purchases, significant differences were only observed in 2014, luxury goods purchases – only in 2020, changes in propensities to save/consume – in 2014, and in housing standards – in 2020. Educational attainment level proved to be the most significant differentiating factor with regard to being well-off or near the poverty line, as well as food product purchases. In all of these cases, the economic situation of households at the lowest level of educational attainment is the most serious. This confirms that the group in question suffers from the highest risk of such socioeconomic phenomena as poverty and material deprivation, which manifest in difficulties in meeting essential needs.

Other research conducted in the region also confirms that education can determine the subjective assessment of the economic situation. It is perceived as one of the diagnostic features of subjective evaluation of household budget management in the model of discrimination proposed by Kasprzyk [2016]. Education also appears among determinants of life quality in research presented by Kawa et al. [2017]. Although the research methodologies used in this research are incomparable, the conclusions about the role of education for well-being are consistent.

CONCLUSIONS

The study indicates a relatively favorable assessment of the socioeconomic situation of households in the Subcarpathian Voivodeship. However, these assessments have changed greatly with changes in the general economy, proving the significance of the relationship between the environment in which households function and the situation the micro-entities are in. The analyses also enabled the identification of differences existing between individuals with different educational attainment levels. In particular, these differences indicate that the economic situation of households possessing the lowest human capital is relatively unfavorable, and that living standards increase together with the level of educational attainment. The differences between educational attainment groups also disappear in situations where the general economy changes significantly – both during upturns and crises. It can thus be concluded that higher education has a special influence on one's economic situation, one that is primarily resilience-related and mitigates disruptions to the quality of life of individuals from this group. Therefore, education remains a factor in strengthening households' economic security.

The results presented here are limited to the assessment of the economic situation of households from the Subcarpathian Voivodeship. Due to regional features, they cannot be extrapolated to the entire population or used to form generalizations. Nevertheless, the analyses presented in this paper are in line with more general trends identified in the relevant literature, which indicates that education has a positive impact on the economic situation. In addition, the analyses fill an empirical gap pertaining to verifying the existence of such an impact from a dynamic perspective in a relatively less economically developed region, that is, the Subcarpathian Voivodeship. A more detailed assessment of the significance of education to material living standards would require taking into account other factors, including non-formal avenues of acquiring education and skills.

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WYKSZTAŁCENIE A SYTUACJA EKONOMICZNA GOSPODARSTW DOMOWYCH W WOJEWÓDZTWIE PODKARPACKIM

STRESZCZENIE

Cel: Celem opracowania jest diagnoza sytuacji ekonomicznej gospodarstw domowych w województwie podkarpackim w latach 2014–2022 oraz identyfikacja znaczenia wykształcenia jako czynnika różnicującego tę sytuację. **Metody:** Realizacja tego zadania opiera się na analizie wyników badań kwestionariuszowych przeprowadzonych w kolejnych pięciu edycjach, co pozwala na dokonanie porównań w czasie. Zgromadzone dane pozwalają na prezentację oceny sytuacji ekonomicznej w ujęciu syntetycznym, jak i w ośmiu szczegółowych aspektach. Zastosowanie analizy wariancji pozwala na statystyczną weryfikację istotności

poziomu wykształcenia dla oceny sytuacji ekonomicznej gospodarstw domowych. **Wyniki:** Uzyskane wyniki potwierdzają, że wzrost poziomu wykształcenia poprawia sytuację ekonomiczną gospodarstw domowych, jednak zróżnicowanie to zanika w sytuacjach zmian koniunktury. Badania wskazują, że osoby o najniższym kapitale edukacyjnym są w największym stopniu narażone na ryzyka społeczno-ekonomiczne, wyrażające się w problemach zaspokojenia najbardziej podstawowych potrzeb bytowych. Jednocześnie sytuacja ekonomiczna osób o najwyższym poziomie kapitału ludzkiego okazuje się najbardziej stabilna, co dowodzi, że wyższe wykształcenie ma charakter czynnika zwiększającego odporność standardu życia na zaburzenia zewnętrzne. **Wnioski:** Można wnioskować, że edukacja pozostaje czynnikiem wzmacniającym bezpieczeństwo ekonomiczne gospodarstw domowych. Oryginalność badań przejawia się w wypełnieniu luki empirycznej związanej z weryfikacją istnienia zróżnicowań materialnego standardu życia w układzie edukacyjnym, diagnozującą sytuację w jednym z peryferyjnych regionów Polski w ujęciu dynamicznych porównań.

Słowa kluczowe: wykształcenie, sytuacja ekonomiczna, gospodarstwa domowe

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DETERMINANTS OF THE INVESTMENTS IN PHOTOVOLTAIC MICRO-INSTALLATIONS BY INDIVIDUAL USERS IN POLAND

Anna Dąbrowska[1], Mariusz Maciejczak[2], Irena Ozimek[2]✉

[1] SGH Warsaw School of Economics, Poland
[2] Warsaw University of Life Sciences, Poland

ABSTRACT

Aim: The paper's objective is to determine the behavior and attitudes of Polish investors and users towards photovoltaic installations in Poland. **Methods:** The survey was carried out by ARC Rynek i Opinia (the Institute of Opinion and Market Research), commissioned by the company Alians-OZE, which, as part of the cooperation between business practice and science, made the results of the research available to the authors of this paper. The study was carried out in April 2021 using the CAWI technique. **Results:** The most important advantage of using photovoltaic micro-installations included factors such as using a source of free energy and independence from electricity price increases. The most important disadvantages were the high price of installation and the period of return on investment. **Conclusions:** The individual users of photovoltaic micro-installations, due to their activities in the green energy market as prosumers, not only increased the amount of renewable energy available, but also increased the social awareness of the benefits of such solutions. Therefore, it is important to promote as part of the pro-ecological policy, as well as the measures aimed at promoting this renewable energy source among individual users.

Key words: renewable energy, residential solar photovoltaics, market behavior, prosumer
JEL codes: Q2, Q5 D12

INTRODUCTION

The introduction of green energy is important to mitigate environmental and climatic conditions. In addition to the need to access energy, the issue of raw materials for production is growing. The modern world is powered by fossil fuels. Coal is responsible for about 40% of the world's CO_2 emissions, which makes reducing its emissions crucial for our planet. Limiting the increase in average temperature to 1.5°C, compared to preindustrial times, requires emissions to be zeroed in the 2050s, and in the case of the 2°C thresholds, it must take place in the 2070s. By 2030, emissions for the 1.5°C target should drop by 45% and for the 2°C target by 25% compared to 2010. Unfortunately, emissions have not decreased since 2010, but on the contrary, they have increased. Among European Union (EU) countries, the leaders in the field of renewable energy are the Scandinavian countries, where a sustainable lifestyle is developing the fastest. It is important to note that Norway has a chance to give up fossil fuels by 2050 [MM Magazyn Przemysłowy Online 2021].

Under the United Nations Framework Convention on Climate Change from 1992, all countries are required to act to "avoid dangerous climate change"

Anna Dąbrowska https://orcid.org/0000-0003-1406-5510; Mariusz Maciejczak https://orcid.org/0000-0002-0630-5628; Irena Ozimek https://orcid.org/0000-0003-3430-8276

✉ irena_ozimek@sggw.edu.pl

and find ways to reduce greenhouse gas emissions fairly. The Conference of Parties (COP), held since the 1990s, aims at developing a global response to the climate crisis. It is clear from the operation of the first European Renewable Energy Directive (2009–2020) that only solar and wind energy have the potential required to meet the targets adopted during this period, namely 20% of energy consumption in the EU needs to come from renewable energy sources (RES) [Jäger-Waldau et al. 2011]. The new European Renewable Energy Directive envisages 32% of EU energy consumption by 2030 to be generated from renewable sources such as wind, solar, hydroelectric, ocean energy, geothermal energy, biomass and biofuels. In July 2021, the EU proposed to the co-legislators a change consisting of setting the target at the level of 40% by 2030 [Directive EU 2018/2001, Directive 2009/28/EC][2]. The European Parliament voted in September 2022 to increase the RES target. Renewables are to account for 45% of the energy mix by 2030. This represents a 5% increase in share compared to the RED II Directive adopted in 2018 [Parlament Europejski 2022]. However, the EU needs to cope with different energy crises or market and political causes [Fracastoro 2014]. Russia's invasion of Ukraine on 24 February 2022 has forced the EU and its Member States to revise their energy transition plans and strengthen energy generation from renewable sources. Thus, political actions are enforced to promote the production of RES. The Fit for 55 package is considered for an update according to the new geopolitical situation. This includes both revising the deadlines of withdrawing fossil fuels and shifting investments towards a larger share of RES in the European energy mix. In response to the Russian invasion of Ukraine, many European Union countries undertook actions aimed at reducing their dependence on Russian natural gas imports [Jos et al. 2022]. The European Commission (EC) enforced the EU Solar Energy Strategy as part of the REPowerEU plan. This strategy aims to bring online over 320 GW of solar photovoltaic capacity by 2025 (more than doubling compared to 2020) and almost 600 GW by 2031. The additional PV capacities are seen to displace the consumption of 9 bcm of natural gas annually by 2027. In the strategy, the EC also assumed the promotion of quick and massive PV deployment via the European Solar Rooftops Initiative for rooftop solar on commercial and public buildings by 2027, and for new residential buildings by 2029, highlighting the role of individual users [European Commission 2022].

The International Energy Agency (IEA) [2022] reports significant growth in solar photovoltaic energy production in the European Union, which is due to a faster rate of implementation of the installation, with an accelerating policy role. The policy-driven growth is visible in Germany, the Netherlands, Poland, Italy and France. It is expected that the impact of new and adjusted European energy policies will be limited by 2023. However, in the next periods, the growth in PV installations on residential and commercial installations will enable consumers to reduce their electricity bills through self-consumption [International Energy 2022].

Moreover, the global demographic trend related to the aging of society and lifestyle changes is becoming more and more noticeable. As a result, the number of one-person households and individuals who are single is growing [Dąbrowska et al. 2019]. Piekut [2020, 2021] identified the satisfaction of needs in terms of maintaining proper thermal comfort in one-person households and in households run by people aged 60 and older. Based on the results of the study, the author claims that perceiving energy poverty only through the prism of income indicators may lead to excluding some individuals from the group of energy-poor people. In some one-person households, despite a low share of energy expenditure in disposable income and a relatively favorable income situation, people reported a high degree of unsatisfied needs related to thermal comfort in the apartment.

The authors, noticing the relationship between meeting energy needs and the health of the society and the healthcare sector, refer to the seventh objective of the UN Sustainable Development Goals. The objective concerns ensuring "access to affordable, reliable, sustainable and modern energy for all", while emphasizing that according to UN data, the global electrification rate reached 89% in 2017, but 840 million people

[2] Directive 2009/28/EC of the European Parliament and of the Council has been substantially amended several times. From the need for further amendments, the directive had to be recast for the sake of clarity

worldwide do not have access to electricity [Kirshner and Broto 2020]. WHO reports that the declining costs of renewable energy technologies are becoming more accessible to healthcare facilities. This is especially true of solar photovoltaic energy [Porcaro et al. 2017].

Currently, the problem of energy is frequently raised during the COVID-19 pandemic. Energy in pandemic conditions plays a key role, as it allows households to function without disruptions. The latter is particularly important in the case of remote learning and remote work taking place at home. Modern electricity is a key factor in improving health systems. It is also an important determinant of human health and, consequently, the achievement of sustainable development goals for health [Chen et al. 2019].

Therefore, the paper's objective is to determine the behavior and attitudes of Polish investors and users towards photovoltaic installations in Poland. The research problems analyzed in this study concerned the following issues: willingness to undertake investments or expand the existing installation; factors influencing the decision to invest; perceived profitability and overall rating of respondents' satisfaction with photovoltaic installations; an indication of sources of information on photovoltaic installations.

MATERIALS AND METHODS

To examine and discuss the determinants of investing in photovoltaic micro-installations by individual users in Poland, the authors carried out a desk study based on a systematic review of the literature. The review following the guidelines by Xiao and Watson [2019] was executed through the search of the scientific databases: Web of Science, Scopus, Ebsco, and Google Scholar using the main keywords: photovoltaic, energy, individual user, renewables, Poland. The selection process consisted of exclusion criteria related to the year – the perspective from 2004 was applied, and for the empirical status of presented results – only solid empirical studies were considered.

The results also include quantitative studies based on survey questionnaires. The survey was carried out by ARC Rynek i Opinia, the Institute of Opinion and Market Research. The empirical study was commissioned by the company Alians-OZE, which, as part of the cooperation between business practice and science, made the results of the research available to the authors of this paper. The study was carried out in April 2021 using the CAWI (Computer-Assisted Web Interview) technique. The researchers used epanel.pl, a research panel administered by ARC Rynek i Opinia, which has about 60,000 registered users. The respondents in the study were individuals who lived in detached, terraced or semi-detached houses. The study was carried out on a sample of 802 people living in their own homes, including 197 respondents who have photovoltaic installations (this group constituted a research sample for the current research). The selection was the case of quota sampling, consistent with the structure of the nationwide population. The structure of the sample was representative of the population of Poles aged 18–65 in terms of gender, age, and the size of the place of residence. After collecting the data, it was weighted twice.

The majority of people who have photovoltaic installations are individuals with higher or secondary education (51.5 and 43.0%, respectively). Most often, people who indicated that they had assessed their financial situation as average responded: "We live on an average level – we have enough money to support ourselves every day, but we have to save for high-value purchases" (52.5%), and those declaring that "We live well – we have enough money for many things without the need to save"(32.5%). Depending on the age group of the respondents, it was noted that the owners of these types of installations most frequently came from two age groups: 35–44 years and 25–34 years (31.5 and 29.5%, respectively). When the place of residence was a differentiating factor, rural residents (44.0%) declared owning photovoltaic installations most frequently. Table 1 presents the characteristics of the respondents' using photovoltaics.

The key issue in shaping the respondents" opinions on renewable sources was the question of whether the photovoltaic installation met their expectations. It was a case of a closed question with a five-point Likert scale. In this question, a rating of 1 represented "definitely not", and a rating of 5 referred to "definitely yes". This scale was also used

Table 1. Respondents' characteristics

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
Education			
Primary	2.0	2.8	1.1
Basic vocational	3.5	0.9	6.5
Secondary	43.0	43.0	43.0
Higher	51.5	53.3	49.5
Age groups			
18–24 years	14.5	22.4	5.4
25–34 years	29.5	31.8	26.9
35–44 years	31.5	28.0	35.5
45–54 years	15.0	10.3	20.4
55+ years	9.5	7.5	11.8
Subjective assessment of the financial situation in the household			
We live very poorly – we do not even have enough money to cover our basic needs	1.5	1.9	1.1
We live modestly – we must carefully manage our money	8.5	6.5	10.8
We live on an average level – we have enough money every day, but we have to save for high-value purchases	52.5	57.9	46.2
We live well – we have enough money without the need to save	32.5	29.9	35.5
We live very well - we can afford certain luxuries	5.0	3.7	6.5
Place of residence			
Country	44.0	47.7	39.8
Town up to 19,000 residents	10.5	15.0	5.4
City from 20,000 to 49,000 residents	11.5	6.5	17.2
City from 50,000 up to 99,000 thousand residents	9.5	10.3	8.6
City from 100,000 up to 199,000 thousand residents	7.5	6.5	8.6
City from 200,000 up to 599,000 thousand residents	9.5	7.5	11.8
City with a population of 500+ thousand residents	6.5	8.6	7.5

Source: own elaboration based on data provided by Alliance RES.

in the question regarding the respondents' opinions on the profitability of the photovoltaic installation. In this case, rating 1 represented the response of "markedly low profitability", and rating 5 was used to describe "very high profitability".

In turn, a scale from 0 to 10 was used in the question concerning the respondents' declarations regarding the recommendation to friends or family to invest in photovoltaic installations. "0" meant that the respondent "would not recommend investing in photovoltaic installations to friends or family at all" and "10" that the respondent would "definitely recommend investing in solar installations to friends or family".

Statistical analysis was performed using the IBM SPSS Statistics version 27.0 package. For the analysis of quantitative data, selected methods of descriptive statistics were used first. Pearson's chi-square test was applied to examine the relation between the above-listed matters and the characteristics of respondents.

The distribution of quantitative variables, assessed on the Likert scale, was investigated using non-parametric tests – the Mann-Whitney U test and the Kruskal-Wallis H test. However, statistical significance was not demonstrated.

The authors also examined the relationship between the opinion of the respondents on whether the photovoltaic installation met their expectations and the profitability of the photovoltaic installation and recommended investment in photovoltaic installations to friends or family of the respondents (using Spearman's correlation).

The analysis of the data collected during the survey was additionally broken down into responses given by men and women. This is related not only to the fact that, as indicated by the IRENA [2019], there is a growing role of women in renewable energy decision-making globally but also to the role of women in Polish households' decision-making. Cecelski [2020] confirmed that women have contributed to the design of household energy technologies and projects. Also, other authors [Accelerating 2018, Lamas et al. 2021] emphasize the role of gender in expanding RES development. It needs to be stressed that when it comes to electricity consumption in Poland, awareness is a key aspect. Electricity use can be automatic, as it accompanies daily habits, e.g., cooking and cleaning. Internal factors, such as pro-environmental attitudes, values, and personal and social norms, cause consumers to monitor their e.e. consumption levels and try to use them more efficiently [Gołębiowska 2020]. In addition, as Frączek's research [2012] indicates, among the factors influencing decisions in this area in Polish households, psychological factors related to security come to the forefront. These are more important for women than for men. Fatuła [2015] argues that concerning gender issues, the differences that occur indicate the specificity of the financial decisions of the household.

THEORETICAL FRAMEWORK

Although the slowdown of the solar thermal market in the EU since 2018 and the more remarkable decrease of new installations in 2020 compared to 2019 by 15.3%, which mostly were caused by the Covid pandemic, the sector is back on track for growth [EurObserv'ER 2021]. The European Union photovoltaic market situation in 2021 has improved with a growth trend, despite challenging conditions mainly related to difficulties in the supply chains of photovoltaic system components [EurObserv'ER 2022]. In this respect, the data presented by the Renewable Energy Institute indicate that in 2020, Poland maintained the 5th position in the EU in terms of the increase of new PV capacities, behind Germany, Spain, the Netherlands and France [Wiśniewski 2020]. The analysis of the European development trends clearly indicates that the changes that will be implemented towards sustainable development in the energy market will depend not only on the decisions and policies of the government but largely on the awareness of household members and their activities as well as the market factors such incentives, prices and energy availability [MM Magazyn Przemysłowy Online 2021].

Concerning Poland, under the Act on Renewable Energy Sources [Dz.U. 2019 poz. 1524], in Poland, the term renewable energy prosumer represents a final customer producing electricity exclusively from renewable energy sources for their own needs in a micro-installation, provided that in the case of a final customer who is not a household electricity user, the latter is not the object of the predominant economic activity determined under the provisions of public statistics regulations.

Prosumer is a combination of the terms producer and consumer, defined as a consumer, in this case, co-creating electricity and supporting such a solution [Gwiazda 2016]. The term is thus understood as an individual or entity that simultaneously consumes and produces electricity for their own needs using a micro-installation, and their predominant economic activity is not related to the production of electricity. The basis for a financial settlement, in this case, is a comprehensive agreement.

The interest in prosumer energy among Poles is relatively high. Installing devices enabling the use of renewable energy sources in their home or farm building in the next 2-3 years was considered by a total of 22% of respondents, and 7% of survey participants indicated that they would "definitely" take such an

opportunity into account. These people were primarily interested in generating energy for their own needs: 72% of them were interested in producing heat energy for their own use, and 46% of the sample indicated their interest in producing electricity. Only less than one in ten people interested in prosumer energy (9%) declared their intention to sell electricity to the grid at a fair price [Gwiazda 2016].

As Kazimierska [2021] emphasizes, the most important advantages of being a prosumer involve three key aspects:

- energy independence – i.e., independence from price increases is one of the most important benefits of prosumer activity. Developing the solutions available to prosumers allows us to predict that from year to year, it will be an increasingly profitable undertaking;
- concern for natural resources – under the conditions of the current climate change and increasing air pollution in Poland, the use of renewable energy sources is the best course of action concerning one's own contribution to environmental protection;
- profitability of the investment – there is probably no other form of investment, such as a solar farm or a small wind farm, that would ensure continuous profit, which is significant for the budget. Investing in renewable energy RES micro-installations is certainly one of the most reliable ways of investing capital nowadays.

According to the average expectations, RES should be the main source of electricity in 2050, supplying nearly half of its production [Derski 2021]. The CBOS research shows that Poles expect a significant decrease in energy coming from coal to 32.7% in 2035 and 15.4% in 2050, and in the next dozen or so years, they expect the development of renewable energy sources (33.8% in 2035 and 47.1% in 2050). The declarations show some reserve in the approach to the development of nuclear energy in Poland (in the perspective of 2035, 8% of electricity should be generated from nuclear energy, and by 2050, the desirable share is estimated at 12.4%). Natural gas has a permanent place in the energy generation system (21.4% in 2035 and 20.6% in 2050). The way of thinking about the future of the energy sector in Poland is differentiated based on socio-demographic characteristics. The analyses show that the development of nuclear energy is one of the most controversial current issues, and the use of renewable energy sources causes discrepancies, to say the least. A share of coal that is slightly higher than average is assumed by elderly people (aged 65+), rural residents, respondents with primary education, and respondents with low or average income per capita. Similarly, older, less educated and less well-off respondents favor the use of natural gas to a slightly greater extent than average. The development of nuclear energy is more often supported by men, residents of the largest cities, respondents with a higher socio-economic status, as well as young people. Women, slightly more often than the average, young people, but also middle-aged people aged 45-64, inhabitants of small towns and medium-sized and the largest cities, people with secondary and higher education, as well as relatively well-off individuals foresee and hope for the development of renewable energy sources [CBOS 2021].

Comparing studies from 2009 and 2016, opinions concerning renewable energy sources have changed significantly in Poland. In the opinion of the vast majority of respondents, renewable energy sources do not emit carbon dioxide at all. The respondents perceive solar, wind, hydro and geothermal energy as climate-friendly, not emitting carbon dioxide (87, 85, 83 and 75% of responses) [Badora 2016].

Energy consumption in Poland is also related to the level and quality of life. Generally speaking, the standard of living is the overall quality of the living conditions and the degree to which important needs such as living comfortably, satisfaction and pleasure in life are met. In this perspective, it is a synonym of broadly perceived living conditions [Piasny 1993]. Quality of life consists not only of the overall objective conditions in which a person lives but also the subjective quality of life experienced by individuals, also referred to as subjective well-being [GUS 2017]. Well-being is very often associated with consumerism, i.e., buying and using excessive amounts of durable goods that consume energy in people's households. In 2020, Polish households recorded purchasing additional household equipment such as a printer (by 17.1%), a dishwasher (by 14.0%), a smartphone (by 9.6%), a device with Internet access (by 6.1%), a car (by 5.3%) and a per-

sonal computer (by 5.2%). The differences in terms of equipment, including these devices, between the city and the countryside are decreasing [GUS 2021a].

Analyzing the situation in Poland for the period 2000–2020, expenses related to the use of a flat or house and energy carriers accounted for 17.9–18.8% of overall household expenditure (Table 1). In hous--holds' budgets, energy carriers include electricity and gas (charges for electricity consumption for lighting and heating purposes, charges for natural gas consumption and for filling gas cylinders for household needs); thermal energy (central heating and hot water) and fuel (liquid fuels <heating oils, kerosene>; hard coal, coke, firewood, other fuel products <lignite, peat, sawdust>) and other fuels [GUS 2021b]. The expenditure on energy carriers in 2000–2020 in Poland accounted for 9.7––10.3% of the structure of total expenditure (Table 2).

The average monthly expenditures per capita in households in relation to the use of a flat or house and energy carriers amounted to 18.8% in the structure of total expenditure in 2020. In individual quintile groups, this value ranged from 17.2% in the highest 5th quintile group and 18.8% in the 1st quintile group to approx. 20% in the 3rd and 4th quintile groups (Table 3) [GUS 2021b].

The lowest expenses in this regard were recorded in rural areas (17.1%), and the highest expenditure was observed in cities with 20–499 thousand residents (from 20.2 to 20% – Table 4), [GUS 2021b].

Table 2. Average monthly expenditures on housing, water, electricity, gas and other fuels per capita in Polish households in 2000–2020

Specification	Years									
	2000	2005	2010	2014	2015	2016	2017	2018	2019	2020
	(PLN)									
Expenditures* on	599.49	690.30	991.44	1078.74	1091.19	1131.64	1176.44	1186.86	1251.73	1209.58
housing, water, electricity, gas and other fuels	107.21	135.64	199.88	216.73	219.48	221.35	229.92	217.44	224.93	227.37
of which electricity, gas and other fuels	58.19	75.83	118.18	123.65	124.38	121.84	125.48	122.54	122.54	124.03
	% share in overall expenditure									
housing, water, electricity, gas and other fuels	17.9	19.6	20.2	20.1	20.1	19.6	19.5	18.3	18.0	18.8
of which electricity, gas and other fuels	9.7	11.0	11.9	11.5	11.4	10.8	10.7	10.3	9.8	10.3

*Since 2013, including expenditures for life insurance.

Source: own elaboration based on [GUS 2021b].

Table 3. Expenditures on housing, water, electricity, gas and other fuels per capita in Polish households by quintile groups

Specification	Grand total	Quintile group				
		I	II	III	IV	V
Expenditures (PLN)	1209.58	845.86	889.11	1064.52	1320.86	1931.42
housing, water, electricity, gas and other fuels (PLN)	227.37	159.13	178	214.11	254.62	331.55
The % share of expenditure related to housing, water, electricity, gas and other fuels in overall expenditure (%)	18.8	18.8	20.0	20.1	19.3	17.2

Source: own elaboration based on [GUS 2021b].

Table 4. Expenditures on housing, water, electricity, gas and other fuels per capita in Polish households by place of residence

Specification	Grand total	Urban							Rural
		total	town/city by size in thousands						
						100–499			
			less than 20	20–99	total	100–199	200–499	500 and more	
Expenditures (PLN)	1209.58	1346.85	1211.65	1200.09	1363.81	1324.85	1398.15	1665.51	994.97
housing, water, electricity, gas and other fuels (PLN)	227.37	264.16	231.18	242.62	273.05	265.61	279.61	315.89	169.84
The % share of expenditures related to housing, water, electricity, gas and other fuels in overall expenditure (%)	18.8	19.6	19.1	20.2	20.0	20.0	20.0	19.0	17.1

Source: own elaboration based on [GUS 2021b].

The construction of micro-photovoltaic systems is becoming more widespread in Poland. This interest has been developing since 2015, when the relevant law came into force. There has been a noticeable increase in the number of installed micro-installations in recent years. Very often, people who are initially skeptical about this type of investment after a certain period of time are convinced to install a photovoltaic micro-installation on their farm [Klepacka and Zalewska 2016]. The main task of a photovoltaic micro-installation is to supply a household with enough electricity so that the electricity produced fully covers the household's needs [Marciniak 2021]. Admittedly, a photovoltaic installation for an individual household is a large investment. However, investors in a photovoltaic micro-installation can reduce the cost of their investment with funds from programs that support the development of photovoltaics, as well as the available rebates. These programs significantly affect the efficiency of the investment, making it profitable from an individual point of view. As reported by Rakowska and Ozimek [2021], in Poland, as in other countries, public aid is significantly triggering, especially local authorities' renewable energy initiatives. It increases the number and scope of renewable energy investments as well as cooperation with other municipalities and participation in these programs of public organizations and private households. The average payback of the installation depends on the productivity effect of a given photovoltaic micro-installation and on the amount of own capital contribution to this investment [Olczak 2021]. Most often, it is about 8-10 years [Gryko 2020, Iwaszczuk and Trela 2021].The most popular support measure – the My Electricity Program, contributed to the creation of approx. 2 GWp of installed capacity in PV installations in 2019–2021. The total cost of the program on the part of the state is approx. EUR 390 million in direct subsidies and additional tax breaks for prosumers [Kulpa et al. 2022]. Gręposz-Krawczyk et al. [2021] study showed that households in Poland can pay for high quality, environmental protection, and future savings. Additionally, the various types of publicly funded programs supporting such investments also address the solutions to solve the problem of energy poverty [Biernat-Jarka et al. 2021]. Regional governments are especially focused on increasing the living conditions for the citizens by promoting programs investing in RES [Batyk et al. 2022]. However, will this favorable outlook on the development of photovoltaics be confirmed? Probably only time will tell. The adopted draft amendment to the RES Act assumes less profitable settlements with electricity suppliers for prosumers. Experts say that the boom in investments in photovoltaic panels will continue in 2021. This would probably be aided by government programs such as "Mój Prąd" (My Electricity). From 2022, however, when the changes proposed by the government come into force, the number of people interested in less profitable micro-installations will probably decrease [Czechowicz 2021].

RESULTS

The study tried to identify how long the respondents used the photovoltaic installation. This factor could have been important for further evaluations and the expressed attitudes. The results of the study are presented in Table 5. The respondents most often declared having photovoltaic installations for less than a year (41.1%) or 1 to 2 years (39.4%). Therefore, it emerges that the majority of respondents (80%) did not have a long experience in the use of photovoltaic installations. Women more frequently than men (44.4% and 37.9%, respectively) declared owning photovoltaic installations for less than a year. In the case of having photovoltaic installations for a period from 1 year to 2 years, the opposite situation was observed. Men more often than women had photovoltaic installations for 1 to 2 years (43.2 and 35.6%, respectively). Only a few respondents indicated that they have photovoltaic installations for 5 years or more (3%). The place of residence of the respondents differentiated the opinions of the respondents in a statistically significant way χ^2 (24) = 42.98, p <05. It is worth noting that the history of photovoltaics in Poland dates back to the beginning of the second decade of the 21st century [Rataj et al. 2021]. However, it was only in 2019 that co-financing for photovoltaics was introduced through the government program "Mój Prąd" (My Electricity).

More than half of the respondents indicated that the biggest incentive for them to install photovoltaic solu-

Table 5. Declarations of respondents regarding the time of owning photovoltaic installations (%)

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
Less than a year	41.1	44.4	37.9
1–2 years	39.4	35.6	43.2
3–5 years	16.5	16.7	16.3
5–10 years	2.6	2.5	2.6
More than 10 years	0.4	0.8	0.0

Source: own elaboration based on data provided by Alliance RES.

Table 6. Respondents' opinions on what prompted them to invest in photovoltaic installations (% responses)

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
Free source of energy	61.9	56.4	67.2
Co-financing of installation	50.3	56.3	44.3
Independence from increases in electricity prices	47.8	45.5	50.0
Ecological aspect – the use of renewable energy sources	45.8	49.2	42.4
Guarantee of energy security (independence from external power suppliers)	25.4	22.0	28.7
Property value increase	21.7	19.1	24.2
Reliability of the photovoltaic installation	21.0	21.3	20.8
Tax relief	20.8	16.0	25.6
Other	0.5	0.0	1.0
I don't know / hard to say	1.8	2.8	0.9

Source: own elaboration based on data provided by Alliance RES.

tions was a free energy source (61.9%) and installation subsidies (50.3%). Less than half of the respondents indicated independence from increases in electricity prices and the environmental aspect, i.e., the use of renewable energy sources. (Table 6).

Almost 1/3 of the users of the photovoltaic installation declared that the installation "definitely" met their expectations, and about 52% of the sample pointed to the "rather yes" answer (Table 7). Women indicated slightly more often than men that the photovoltaic installation "definitely" met their expectations (37.5 and 26.3%, respectively). Men, on the other hand, expressed opinions that the photovoltaic installation "rather" met their expectations more often than women (57.4 and 45.8%, respectively). Gender significantly differentiated the opinions of the respondents in this respect in a statistically significant manner (Table 7).

Among the survey participants, 2/3 of the respondents were convinced that the profitability of the photovoltaic installation is high or rather high (including about 18% of the responses that it is definitely high). However, almost a quarter of the respondents could not unequivocally answer this question, selecting the answer of "neither low nor high" (Table 8). It is worth noting that the lifetime of the photovoltaic installation (the time of use) in the case of 41% of respondents did not exceed 1 year, and in the case of 39%, it did not exceed 2 years.

Among the most important advantages and benefits of using photovoltaic installations, the respondents indicated two factors: free energy source (86.3%) and independence from increases in electricity price (78.5%). Over 2/3 of the respondents indicated the ecological aspect, i.e., the use of renewable energy sources (Table 9).

The most important disadvantages related to the use of photovoltaic installations that were most of-

Table 7. Opinions of the respondents about whether the photovoltaic installation met their expectations (%)

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
Definitely not	3.6	2.9	4.3
Rather not	3.0	2.6	3.4
Neither yes nor no	9.8	11.2	8.5
Rather yes	51.6	45.8	57.4
Definitely yes	31.8	37.5	26.3

Source: own elaboration based on data provided by Alliance RES.

Table 8. Opinions of the respondents on the profitability of a photovoltaic installation (%)

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
Definitely low	2.3	0.6	4.0
Rather low	7.2	8.4	6.0
Neither low nor high	23.6	21.2	25.9
Rather high	49.0	51.1	47.0
Definitely high	17.9	18.7	17.1

Source: own elaboration based on data provided by Alliance

ten indicated by the survey participants included the high price of the installation and the period of return on investment (77.4 and 71.2%, respectively). Women (83.8%) indicated the high price of the installation more often than men (71.1%). This can be explained by the fact that women are frequently responsible for household budgets. Less than 2/3 of the respondents indicated a decrease in the efficiency of the installation under unfavorable weather conditions. Nearly half of the respondents pointed to procedures related to grants and legal regulations as important disadvantages of using photovoltaic installations (Table 10).

The problems that may occur during the purchase or installation of photovoltaic installations were an important issue raised in the study. More than 2/5 of the respondents did not encounter such problems. This may be interpreted as the confirmation of the high quality of the devices and related services. The problem indicated most frequently was the issue related to obtaining a subsidy or obtaining a source of financing (24.1 and 19.5%, respectively). These problems were mentioned more often by men than by women (Table 11).

Investing in installations producing energy from renewable sources requires significant financial outlays from the outset. When investing in photovoltaic installations, respondents most often used their own resources (67.4%) and co-financing (or subsidies) (46.7%). Women used the subsidies more often than men (52.7 and 40.7%, respectively) (Table 12).

Table 9. The most important advantages and benefits of using photovoltaic installations indicated by the respondents (% of responses)

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
Free source of energy	86.3	89.2	83.4
Independence from increases in electricity prices	78.5	74.6	82.4
Ecological aspect – the use of renewable energy sources	69.3	71.1	67.5
The increase in property value	33.4	37.4	29.5
Reliability of the photovoltaic installation	32.5	27.6	37.2

Source: own elaboration based on data provided by Alliance RES.

Table 10. The most important disadvantages related to the use of photovoltaic installations indicated by the respondents (% of responses)

Specification	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
High installation cost	77.4	83.8	71.1
ROI (payback) period	71.2	70.2	72.3
The decrease in installation efficiency in unfavorable weather conditions	62.1	62.4	61.8
Procedures related to grants and legal regulation	49.2	45.2	53.2
The need to clean the photovoltaic installation	40.0	38.4	41.7

Source: own elaboration based on data provided by Alliance RES.

Table 11. Problems indicated by the respondents which occurred during the purchase or assembly of photovoltaic installations (% of responses)

Specification	% of All [N = 197]	Gender	
		% of women [N = 98]	% of men [N = 99]
Problems with obtaining a subsidy	24.1	22.5	25.7
Problems with obtaining a source of financing	19.5	16.6	22.4
No possibility to eliminate shading (and the related decrease in system efficiency)	13.7	10.9	16.5
Improper installation	10.6	6.4	14.7
Others	1.1	0.8	1.4
I don't know/hard to say	12.6	21.3	4.0
I have not encountered any problems	43.0	43.8	42.2

Source: own elaboration based on data provided by Alliance RES.

Table 12. Sources of financing used by the respondents when making investments in photovoltaic installations (% of responses)

Specification	% of All [N = 197]	Gender	
		% of women [N = 98]	% of men [N = 99]
Own funds	67.4	68.0	66.7
Co-financing / subsidies	46.7	52.7	40.7
Credit	13.4	10.1	16.5
Bank loan	14.1	13.7	14.4
Leasing	1.9	3.2	0.6
Other	1.1	2.2	0.0
I don't know/hard to say	3.3	5.0	1.7

Source: own elaboration based on data provided by Alliance RES.

The respondents most often declared that when deciding to install photovoltaic devices, they benefited from the subsidies: "Mój prąd" (My Electricity) (16.2%) "Czyste Powietrze" (Clean Air) – 16.2%, "Ulga podatkowa związana z termomodernizacją" (Tax relief related to thermal modernization)–- 14.7% and "Program regionalny" (Regional Program) (e.g., Poznań – Program Słoneczne Dachy/Sunny Roofs Program) – 8.6%.

The purpose of the study was also to gain knowledge of whether photovoltaic installation users would recommend these solutions to their friends or family. Respondents were asked to respond to this question using a scale from 0 to 10. In the question, the score "0" meant that the respondent "would not recommend investing in photovoltaic installations to friends or family at all" and "10" would be assigned to the response related to the situation where the respondent "would definitely recommend investing in photovoltaic installations to friends or family"). The vast majority of respondents would recommend investments in photovoltaic installations to their friends or family (the share of 6% and more ratings was 95.1% – Table 13). This means that there is potential for the growth and development of clean energy production.

Descriptive statistics for selected assessments of photovoltaic installations by the respondents are presented in Table 14.

The authors examined the relationship between the respondents' opinions on whether the photovoltaic installation met their expectations. The other aspects as-

Table 13. Declarations of the respondents regarding the recommendation to invest in photovoltaic installations to friends or family (%)

Assessment	% of All [*N* = 197]	Gender	
		% of women [*N* = 98]	% of men [*N* = 99]
0	1.3	0.6	2.0
2	0.4	0.0	0.9
3	0.3	0.5	0.0
4	1.0	0.9	1.1
5	1.9	2.2	1.7
6	12.1	11.4	12.8
7	11.2	10.9	11.5
8	26.9	23.0	30.8
9	22.7	30.8	14.7
10	22.2	19.8	24.6

(Rated on a scale from 0 to 10. In this case, '0' means that the respondent would 'not recommend the investment in photovoltaic installations to friends or family at all' and '10' means that the respondent would 'definitely recommend investing in photovoltaic installations to friends or family')

Source: own elaboration based on data provided by Alliance RES

Table 14. Descriptive statistics for selected assessments of photovoltaic installations by the respondents

Description	Gender	*N*	Mean	Std. error	Median	Std. Dev.	Skew–ness	Kurto-sis
the photovoltaic installation met their expectations*	Women	98	4.02	.092	4.00	.951	–1.310	2.134
	Men	99	4.04	.097	4.00	.932	–1.571	3.230
	all	197	4.03	.066	4.00	.940	–1.417	2.520
profitability of the photovoltaic instal-lation**	Women	98	3.69	.089	4.00	.926	–.652	.256
	Men	99	3.70	099	4.00	.953	–.898	1.083
	all	197	3.70	.066	4.00	.936	–.766	.616
recommendation of a photovoltaic installation to friends/family***	Women	98	8.11	.163	8.00	1.690	–1.530	4.336
	Men	99	8.03	.207	8.00	1.992	–1.784	4.757
	all	197	8.08	.130	8.00	1.832	–1.692	4.690

* the evaluation was made on a 5-point scale, where 1 represented the response "definitely not", and 5 – "definitely yes"; ** assessment made on a 5-point scale, where 1 represented "markedly low profitability", and 5 – "very high"; *** assessment made on a scale from 0 to 10, where "0" – means that the respondent "would not recommend investing in photovoltaic installations to friends or family at all", and "10" that the respondent would "definitely recommend investing in photovoltaic installations to friends or family".

Source: own elaboration based on data provided by Alliance RES.

sessed by the study were the profitability of the photovoltaic installation and the respondents' recommendation to invest in photovoltaic installations to their friends or family. It is important to note that the increase in the positive assessment of the respondents of the photovoltaic installation was accompanied by an increase

Table 15. Spearman's rho correlation coefficients

Categories/ Spearman's rho	The photovoltaic installation met their expectations	Profitability of the photovoltaic installation**	Recommendation of the photovoltaic installation to friends/family***
The photovoltaic installation met the respondents' expectations1	X	.558**	.605**
Profitability of the photovoltaic installation2*	.558**	X	.514**
Recommendation of the photovoltaic installation to friends / family3	.605**	.514**	X

**correlation statistically significant at 0.01 (two-tailed) **; 1) the evaluation was made on a 5-point scale, where 1 represented the response "definitely not", and 5 – "definitely yes"; 2) assessment made on a 5-point scale, where 1 represented "markedly low profitability", and 5 – "very high"; 3) assessment made on a scale from 0 to 10, where "0" – means that the respondent "would not recommend investing in photovoltaic installations to friends or family at all", and "10" that the respondent would "definitely recommend investing in photovoltaic installations to friends or family".

Source: own elaboration based on data provided by Alliance RES.

Table 16. Declarations of the respondents regarding plans for further use of their photovoltaic installation (%)

Specification	% of All [N = 197]	Gender	
		% of women [N = 98]	% of men [N = 99]
I plan to use it without introducing any changes or modifications	57.1	64.7	49.7
I am planning to expand my photovoltaic installation	23.7	16.4	30.9
I am planning a new/additional investment in a new location	2.2	1.8	2.5
Other plans, what kind?	0.6	0.0	1.1
I don't know/hard to say	16.4	17.1	15.8

Source: own elaboration based on data provided by Alliance RES.

in both the profitability of the photovoltaic installation (Spearman's rho = 0.558, p <0.01, respectively) and the willingness to recommend the photovoltaic installation to friends/family (Spearman's rho = 0.605. p <0.01). The highest coefficient was noted between the answer to the question about meeting the expectations and the order of the photovoltaic installations (Spearman's rho = 0.605. p <0.01). The lowest coefficient was recorded between the profitability declared by the survey participants and the recommendation of photovoltaic installations (Spearman's rho = 0.514. p <0.01) (Table 15).

More than half of the respondents plan to continue using their photovoltaic installation, and less than a quarter of them plan to expand it (Table 16). Women did not plan to introduce any changes to their installation more often than men. The declarations regarding the expansion of their photovoltaic installations applied to men twice as often as women. Gender significantly differentiated the opinions of the respondents in this regard.

The study participants emphasized that they most often obtain information on photovoltaic installations and renewable energy sources using a search engine on the Internet (46.5%) and from friends and family (43.5%). Additionally, about 1/3 of the respondents pointed to industry websites, information obtained directly from the seller and blogs or internet forums (Table 17). Multi-channel information acquisition allows for more informed decision-making, taking into account the experience of individual

Table 17. The sources of information on photovoltaic installations and renewable energy sources (RES) declared by the respondents (% of responses)

Specification	% of All [N = 197]	Gender	
		% of women [N = 98]	% of men [N = 99]
Search engine (e.g., Google)	46.5	47.7	45.2
Friends/family	43.5	50.5	35.5
Industry websites	37.0	36.4	37.6
Directly from the seller	34.0	30.8	37.6
Blogs and internet forums	33.0	32.7	33.3
Social media (e.g., Facebook)	24.5	31.8	16.1
Offices and institutions (e.g., local governments, municipal offices, town halls or ministries)	23.5	25.2	21.5
Economic and business media	22.5	17.8	28.0
Other	1.5	0.9	2.2
I don't know/hard to say	2.0	2.8	1.1
I do not use any sources of knowledge	1.0	0.0	2.2

Source: own elaboration based on data provided by Alliance RES.

users who have already invested in micro-photovoltaic systems.

DISCUSSION

According to the Institute for Renewable Energy (Instytut Energii Odnawialnej), photovoltaics in Poland, unlike many countries in Europe, currently has a prosumer character. In the CBOS survey from 2016, 50% of 992 respondents indicated that it is necessary to focus on renewable energy sources, i.e., solar radiation, wind, water and biomass. At the same time, only every fifth respondent stressed (including 7% – "definitely yes", and 15% – "rather yes") that they are considering the use of installations enabling the use of renewable energy sources in their home/outbuilding as part of investment plans in the next 2–3 years [Rynek 2021].

In the CBOS study (2016), people considering the independent production of heat energy showed a marked preference for solar collectors (76%). The respondents intended to generate electricity using installations focused primarily on photovoltaic panels (73%). Rural dwellers (26%) more often than city dwellers considered the possibility of installing devices that enable the use of renewable energy sources in their homes or outbuildings. This solution was the most popular among people working on private farms (36%) [Gwiazda 2016].

The study shows that incentives for owning photovoltaic installations are also important. In the proprietary research, more than half of the respondents indicated that a free source of energy (61.9%) and funding for installation (50.3%) were the factors that prompted them to invest in photovoltaic installations. Less than half of the respondents indicated independence from increases in electricity prices. Our study also indicated that energy independence is very important to Polish consumers, similarly to the ecological aspect, i.e., the use of renewable energy sources. These findings are confirmed by the results of other studies, e.g., the SunSol report "Poles and solar farms 2021" commissioned by the Quantify research agency. The survey, which was carried out in June 2021 using an online questionnaire (CAWI) on a representative group of 1,000 respondents [Kurek 2021], pointed to the main motivations for using RES. The main incentive for Poles is the independence from external suppliers associated with using energy

generated by photovoltaic panels. This answer was indicated by 72% of respondents. The remaining answers to the question included a 22% share pointing to "partially", and 6% of the respondents indicated the opposite opinion. In addition, half of the respondents also considered photovoltaic panels to be the best energy solution in terms of ecology.

In the study, the most important disadvantages related to the use of photovoltaic installations most often indicated by the respondents included: the high price of the installation and the period of return on investment (77.4 and 71.2%, respectively). As emphasized by Wolske et al. [2018], households' use of energy-efficient and renewable energy technologies can significantly reduce emissions from electricity generation. However, high installation costs are often an obstacle in deciding to switch to renewable energy, even if the future energy savings can offset the costs. The researchers carried out a series of randomized experiments to establish whether framework strategies based on behavioral economics and psychology can be used to increase the financial attractiveness of such products. The study involving mock advertising for Residential Solar Photovoltaics (PV) revealed that the reformulation of the financial benefits of photovoltaics does not significantly affect the attractiveness of photovoltaics or the likelihood of responding to false advertising. However, it was discovered that the basic motivations and incentives for consumers (i.e., perceived social support, consumer innovation, and personal environmental standards) are the main drivers of interest in the use of solar energy. The study findings suggest that tailoring messages to target consumer segments may be more effective than trying to promote the financial benefits of solar PV to a wider public [Wolske et al. 2018].

It can be learned from the study that the respondents most often learn about photovoltaic installations and renewable energy sources using a search engine on the Internet (almost half of the respondents). Friends and family are the second most popular source of information for them. Also, according to the SunSol report, 41% of the respondents were already interested in the topic and looking for additional information. They paid attention to the price when choosing the company's services (60%). The next important factor was the guarantee and quality of the components used (55 and 46% of survey participants). 44% of the respondents noted the company's qualifications, and a 40% share indicated previous projects. Reviews on Google are important to 28% of respondents, and certificates and awards for 16% of the survey participants [Kurek 2021].

As the findings of the research show, the respondents most often indicated the problem connected with obtaining a subsidy or the problem related to obtaining a source of financing. The respondents most often declared that they benefited from the subsidies for photovoltaic installations. The sources of funding included the subsidies such as "Mój prąd" (My Electricity) – 16.2%, "Czyste Powietrze" (Clean Air) – 16.2%, "Ulga podatkowa związana z termomodernizacją" (Tax relief related to thermal modernization) (14.7%) and "Program regionalny" (the Regional Program) – 8.6%. Other studies also confirm the popularity of these subsidies. According to the SunSol report, Poles are familiar with government programs for financing photovoltaic investments. The aforementioned "Czyste Powietrze" program was indicated by 51% of respondents and "Mój prąd" by 31% of respondents. "Ulga podatkowa związana z termomodernizacją" program, which offers the highest co-financing (annual income deduction), came third in the ranking. 14% of respondents have heard about individual loans and preferential loans, and 5% of respondents have not heard of any co-financing program [Kurek 2021]. It is worth emphasizing that on 6 October 2021, the call for applications for co-financing photovoltaic micro-installations under the "My Electricity 3.0" program for 2021–2023 (started on 1 July 2021) was closed by the National Fund for Environmental Protection and Water Management (NFOŚiGW) due to exhaustion of funds. PLN 534 million was allocated for this purpose, and 178,000 households benefited from subsidies of up to PLN 3,000 [Kołodziejszyk 2021].

Finally, the results indicate different gender perspectives on investments in photovoltaic micro-installations in Poland. For women more than men, the investments were related not only to high profitability despite initial significant installation costs, but also to ecological aspects. On the contrary, for men more than for women, the factors related to independence from energy prices were more important, which led to the declaration that

they would plan to expand the investment. Also, the results of the study by Rosak-Szyrocka and Żywiołek [2022] show that respondents with knowledge about energy behave differently by gender on issues related not only to consumption but also to source and investment in green energy.

CONCLUSIONS

The status of prosumers of green energy is an upper level of consumption and contributes to a higher level of sustainability awareness. The research conducted on the representative research sample of individual users of micro-photovoltaic installations in Poland allows for identifying the determinants of the willingness to invest in such solutions as well as satisfaction with being a prosumer of green energy. It was found that the surveyed respondents mostly used micro-installations for a short period (80.5% for up to 2 years), and generally expressed satisfaction with the investment, assessing it as profitable. The most important advantage of using photovoltaic micro-installations included factors such as using a source of free energy (86.3%) and independence from electricity price increases (78.5%). The most important disadvantages were the high price of installation and the period of return on investment (77.4 and 71.2%, respectively). The vast majority of respondents would recommend investments in photovoltaic micro-installations to other potential users, especially their friends or family (95.1%). The recommendation would be more likely to be given by women than men. The individual users of photovoltaic micro-installations, due to their activities in the green energy market as prosumers, not only increased the amount of renewable energy available but also increased the social awareness of the benefits of such solutions. Therefore, it is important to promote, as part of the pro-ecological policy, investment in photovoltaic micro-installations as well as the adopted measures aimed at promoting this renewable energy source among individual users. The study's main limitation is the lack of regional perspective on the issues discussed. Therefore, further research in this area should primarily take into account this aspect.

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DETERMINANTY INWESTYCJI W MIKROINSTALACJE FOTOWOLTAICZNE PRZEZ UŻYTKOWNIKÓW INDYWIDUALNYCH W POLSCE

STRESZCZENIE

Cel: Celem artykułu jest określenie zachowań i postaw polskich inwestorów i użytkowników wobec instalacji fotowoltaicznych w Polsce. **Metody:** Badanie zostało zrealizowane przez ARC Rynek i Opinia (Instytut Badania Opinii i Rynku) na zlecenie spółki Alians-OZE, która w ramach współpracy praktyki gospodarczej z nauką udostępniła wyniki badania autorom niniejszego opracowania. Badanie zostało przeprowadzone w kwietniu 2021 roku techniką CAWI. **Wyniki:** Do najważniejszych zalet korzystania z mikroinstalacji fotowoltaicznych należały takie czynniki jak korzystanie ze źródła darmowej energii oraz uniezależnienie się od wzrostu cen energii elektrycznej. Najważniejszymi wadami były wysoka cena instalacji oraz okres zwrotu z inwestycji. **Wnioski:** Indywidualni użytkownicy mikroinstalacji fotowoltaicznych, dzięki swojej aktywności na rynku zielonej energii jako prosumenci, nie tylko zwiększyli ilość dostępnej energii odnawialnej, ale także podnieśli świadomość społeczną na temat korzyści płynących z tego typu rozwiązań. Dlatego tak ważne jest promowanie, w ramach polityki proekologicznej, działań mających na celu promocję tego odnawialnego źródła energii wśród indywidualnych użytkowników.

Słowa kluczowe: energia odnawialna, fotowoltaika w budynkach mieszkalnych, zachowania rynkowe, prosument

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GOVERNMENT EXPENDITURES ON HOUSEHOLD CONSUMPTION – LEVEL, CHANGES, AND THEIR RELATIONSHIP WITH SOCIO--ECONOMIC DEVELOPMENT INDICATORS IN EUROPEAN COUNTRIES

Marlena Piekut✉

Warsaw University of Technology, Poland

ABSTRACT

Aim: The aim of this article is to examine changes in government expenditures on household consumption in European countries and the relationship of these expenditures with socio-economic indicators. **Methods:** The study is based on data analysis from 36 European countries, using the Eurostat database and various rankings such as the Happiness Index, Human Development Index, Sustainable Development Goals, and Social Progress Index. The analysis focused on the trends in government expenditures on household consumption and aimed to explore the association between these expenditures and socio-economic indicators. **Results:** Significant changes in the share of government expenditures on household consumption in the GDP were observed among the studied countries during the period from 2011 to 2022. Some countries increased their expenditures, while others decreased them. Cluster analysis revealed four groups of countries based on the share of government expenditures on household consumption in GDP. **Conclusions:** There was no direct correlation between the level of government expenditures on household consumption and socio-economic indicators among the studied countries. Instead, variations in socio-economic development were observed among different groups of countries, regardless of the level of government expenditures on household consumption.

Key words: government expenditures, household consumption, socio-economic indicators, European countries, trends
JEL codes: C51, F02, G28, H50

INTRODUCTION

Some researchers argue that government expenditures on household consumption are a crucial indicator of the government's commitment to addressing the well-being and welfare of its citizens. This expenditure reflects the allocation of resources toward social programs and services that directly benefit households and individuals. The importance of public spending on households lies in several key aspects, i.e., social welfare, income redistribution, economic stability, human capital development, social cohesion, and sustainable development. By allocating resources to support households, governments can enhance the overall welfare of their citizens and foster an environment that encourages individual and societal progress [Gali et al. 2004, Gough 2017, UN 2018].

Marlena Piekut https://orcid.org/0000-0001-6449-5143

✉ marlena.piekut@pw.edu.pl

Others oppose this type of budget spending. Some of the main arguments against such expenditures include concerns related to economic liberalism, irrational spending, increasing public debt, potential disincentives to work, exacerbating social inequalities, and unintended side effects.

The aim of this paper is to present the changes in the shares of government expenditures on household consumption in European countries and to determine whether the level of these expenditures is related to the levels of indexes describing socio-economic conditions.

The research questions are as follows:

1. What are the developmental trends in the level of government expenditures on household consumption?
2. Do higher government expenditures on household consumption contribute to the improvement of socio-economic indexes?

THEORIES AND CONCEPTS CONCERNING THE ROLE OF PUBLIC SPENDING FOR HOUSEHOLDS IN THE CONTEXT OF DEVELOPMENT AND WELFARE OF SOCIETY

Government expenditures on household consumption play a crucial role in the context of societal development, and various theories and concepts shed light on its significance.

The Keynesian theory emphasizes the importance of government intervention in the economy, particularly during economic downturns. Increased public spending on households through social welfare programs and infrastructure projects can stimulate demand, boost consumption, and create jobs, contributing to economic growth and development [Bornemann 1976].

The concept of the welfare state highlights the government's responsibility to provide social protection and support to its citizens. Public spending on households is a core element of the welfare state, ensuring access to healthcare, education, housing, and other essential services, which fosters a more equitable and cohesive society [Gough 2017].

According to social capital theory, government expenditures on household consumption can foster social capital, which refers to the networks, relationships, and trust within a community. Investments in social programs and services can strengthen social ties, promote civic engagement, and enhance collective well-being, contributing to a more resilient and cohesive society [Midgley and Livermore 1998].

Behavioral economics considers the impact of psychology and human behavior on economic decision-making. Government expenditures on household consumption can be designed in ways that encourage positive behaviors, such as savings, education, and healthy lifestyle choices, thereby fostering long-term societal development.

The social investment perspective advocates for proactive public policies that focus on investing in people's potential and capabilities. Government expenditures on household consumption, particularly in early childhood education and support for vulnerable populations, can yield positive returns and contribute to societal development [Blancherd and Perotti 2002, Gali et al. 2004].

In summary, various economic theories and concepts highlight the significance of public spending on households in driving societal development. By providing essential services, social protection, and fostering human capital, such spending contributes to economic growth, social cohesion, and the overall well-being of citizens, thus laying the foundation for a sustainable and prosperous society.

In economic considerations, both positive and negative consequences of government expenditures on household consumption are highlighted. There are theories and concepts in economics that emphasize the negative impact of public spending on household well-being. Opponents of extensive government involvement argue that high public spending can lead to: a) increased tax burdens on households, reducing their disposable income; b) higher costs of conducting business and investments, negatively affecting entrepreneurship and job creation; c) possible budget deficits and the need to finance them through borrowing, leading to higher costs of servicing public debt and economic uncertainty; d) increased bureaucracy and inefficient use of public funds, limiting the effectiveness and flexibility of economic policy [Atkinson 1995, Gough 2016, p. 29].

The "Crowding Out" theory is one of the important approaches highlighting the negative consequences of public spending [Şen and Kaya 2014]. According to this theory, when the government increases its spending, it often borrows money from the financial market, which raises interest rates [Weibel et al. 2014]. Higher interest rates can result in reduced private investments as the cost of credit increases, and businesses start to avoid taking loans. As a consequence, private investments and economic growth may be constrained, negatively impacting household well-being. However, it is worth noting that these approaches are not unanimous in the scientific literature, and evaluating the impact of public spending on household well-being is a complex issue, requiring consideration of multiple factors and economic contexts.

GOVERNMENT FINAL CONSUMPTION EXPENDITURE IN NATIONAL ACCOUNTS

The concept of government final consumption expenditure in national accounts is an accounting convention that may appear less straightforward to interpret. Government final consumption expenditure encompasses two fundamental components. Firstly, it comprises expenditures related to the production of government non-market goods and services provided entirely free of charge (and derived residually). Such output cannot be practically presented as intermediate consumption or final consumption of other sectors. The valuation of non-market output is indirectly performed through conventions, summing production costs (e.g., wages and salaries, intermediate consumption, and consumption of fixed capital), while any partial payments for non-market output are deducted. The second part of government final consumption expenditure includes goods and services acquired by government units from market producers and then distributed to the household sector as social transfers in kind. It is essential to strictly differentiate concepts like government final consumption expenditure (P.3), government total expenditure (TE), or government current expenditure as they vary in scope, coverage of transactions, and the inclusion or exclusion of imputed flows [Pulpanova 2013].

In this study, the amount of government final consumption expenditure (P.3) is analyzed. In national accounts, the category of this consumption (P.3) encompasses expenditures incurred by institutional units that are residents on goods and services used to directly satisfy the individual and collective needs of the society. In the government sector, consumption consists of the sum of non-market output (P.132) and social transfers in kind (D.63). Consumption (P.3) is further divided into individual consumption (P.31), which includes the value of non-market goods and services provided free of charge to the household sector, and collective consumption (P.32), representing the value of non-market goods and services intended for consumption without specific individual recipients [GUS 2010, p. 17].

In summary, government expenditures on household consumption (in national income accounting called government final consumption expenditure) refers to the value of goods and services acquired or produced by the government and then directly provided to private households for their consumption needs. This form of public spending involves the government acting as a direct supplier of goods and services to support household consumption [Eurostat 2023].

In the conducted study, a research gap was observed. According to the author's knowledge, no previous studies have examined the relationship between socio-economic measures and government expenditures on household consumption. Examples of such measures include the Human Development Index, Social Progress Index, Happiness Index, and Sustainable Development Goals Index.

MATERIAL AND METHODS

The data source was the Eurostat database and the following rankings: Happiness Index (HP), Human Development Index (HDI), Sustainable Development Goals (SDG), and Social Progress Index (SPI).

The Happiness Index measures the subjective level of happiness and well-being in society, assessing people's satisfaction with their lives and overall emotional well-being.

According to the UNDP [2015], the Human Development Index evaluates a country's social and economic development, considering life expectancy, education, and income per capita. This index is used to assess differences in development.

Sustainable Development Goals is a set of 17 goals established by the United Nations to promote sustainable social, economic, and environmental development by 2030. The SDG Index provides a framework for evaluating a country's or region's performance in relation to each of the 17 SDGs and their associated targets. This index tracks progress in achieving sustainable development goals, encompassing a wide range of social, economic, and environmental aspects that impact the overall quality of life and well-being of communities.

The Social Progress Index is an indicator that focuses on a more comprehensive approach to measuring social progress, considering a country's ability to meet its citizens' basic needs, improve their quality of life, and enable them to reach their full potential.

The analysis was carried out for 36 countries from Europe.

Study Design:

Step 1. Level and Changes over Time in Final Consumption Expenditure by General Government

1. Data aggregation;
2. Creation of a ranking of countries based on final consumption expenditure by general government in GDP;
3. Calculation of changes in the years 2011–2022 (linear trends of changes);

   A linear trend is a special case of linear regression where the explanatory variable X is the time variable t.

   Linear trend function:

$$y = a \times t + b$$

   where:

   a – the slope of the trend line is calculated as follows,

   b – the intercept of the trend

   When $a > 0$, we have a positive trend. The larger the value of a, the faster the Y value increases over time. When $a < 0$, we have a negative trend. The smaller the value of a, the faster the Y value decreases over time.
4. Calculation of Correlation Between Government Expenditure Share on Household Consumption and HI, HDI, SDG, and SPI Indicators

It was assumed to use the Pearson correlation when the variables have a normal distribution, and Spearman's correlation coefficient when the variables do not have a normal distribution. Correlation coefficients were calculated between the share of government expenditure on household consumption in 2022 and selected socio-economic indicators. Based on the Shapiro-Wilk test, it was found that HI and SDI had a normal distribution.

Step 2. Relationships between groups of countries based on the level of final consumption expenditure by general government and socio-economic development indicators

Conducting a cluster analysis using the Ward method;

1. Performing the Kruskal-Wallis test;
2. Conducting post-hoc multiple comparison tests of mean ranks for all samples.

The Ward method, developed by its namesake, emphasizes grouping profiles into clusters to facilitate the examination of relationships in datasets. The method aims to minimize heterogeneity rather than optimize, focusing on finding the highest similarity among profiles. In cluster analysis, quantifying the mutual similarity of objects is essential, and commonly achieved using metrics. The squared Euclidean distance metric is frequently employed with the Ward method [Blashifielsd et al. 1988].

The Ward method with squared Euclidean distance as a measure of distance was used. The variables used for the analysis were the final consumption expenditure of the general government in percent of GDP in 36 European countries from 2011 to 2022 (each year was one variable).

In order to compare differences between the analyzed groups in the level of socio-economic development indicators, analysis of variance (ANOVA) was considered. However, due to the violation of the assumption of equal variances (for all variables) and the assumption of normal distribution (in the 4th cluster,

the Sustainable Development Goals Index did not have a normal distribution), the Kruskal-Wallis test was utilized. The non-parametric Kruskal-Wallis test does not require the assumption of normality of the distribution and equal variances.

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{p} \frac{R_i^2}{n_i} - 3(N+1),$$

where:
H – Kruskal-Wallis test,
N – total number of observations,
P – number of compared groups,
R_i – sum of ranks in a given group,
n_i – number of observations in a given group.

For multiple comparisons of means between individual groups, multiple mean rank comparison tests for all samples were used. The calculations were performed using the Statistica software.

RESULTS

Government expenditures on household consumption in European countries in 2022 ranged from 10.2 to 25.9% of GDP. The ranking of countries based on the final consumption expenditure of the general government in 2022 yielded the following results: The highest government expenditures on household consumption, approximately 24–26% of GDP, were observed in Iceland, the Netherlands, Sweden, Belgium, Finland, and France. The lowest shares of government expenditures on household consumption in GDP, around 10–12%, were recorded for Albania, Switzerland, Kosovo, Turkey, and Ireland (figure 1). Of the 36 countries analyzed, 21 countries reduced (in percentage points) the share of government spending on household consumption between 2011 and 2022.

The results of the analysis indicated that from 2011 to 2022, there was a statistically significant increase in government expenditures on household consumption in Bulgaria (by 2.7 p.p.), Germany (2.8 p.p.), Estonia (1.0 p.p.), Latvia (0.6 p.p.), Luxembourg (1.4 p.p.),

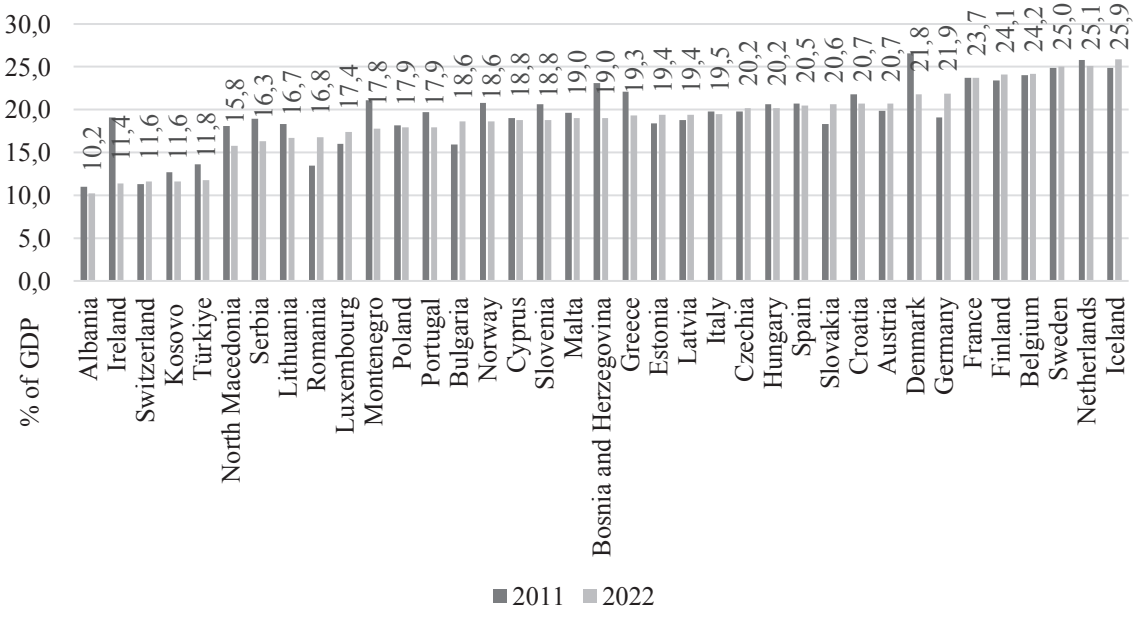

Fig. 1. Government expenditures on household consumption in the percentage of gross domestic product in European countries in 2011 and 2022

Source: the Author's calculation.

Table 1. The results of the differences in the share of government expenditures on household consumption in GDP between 2022 and 2011 and the trend analysis for these expenditures in European countries in 2011–2022

Countries	Difference 2022–2011 (p.p.)	B	R^2	*p*-value
Belgium	0.2	–0.022	0.019	0.6720
Bulgaria	2,7	0.259	0.4357	0.0138
Czechia	0,4	0.136	0.2011	0.0809
Denmark	–4,8	–0.339	0.8262	0.0000
Germany	2,8	0.267	0.7593	0.0001
Estonia	1,	0.150	0.5221	0.0048
Ireland	–7,7	–0.678	0.7448	0.0002
Greece	–2,8	–0.093	0.0074	0.3227
Spain	–0,2	0.064	0.0473	0.4972
France	0,0	0.001	0.0000	0.9806
Croatia	–1,1	–0.003	0.0000	0.9743
Italy	–0,3	–0.011	0.0047	0.8314
Cyprus	–0,2	0.027	0.0024	0.8792
Latvia	0,6	0.221	0.4904	0.0067
Lithuania	–1,6	–0.023	0.0139	0.7149
Luxembourg	1,4	0.170	0.5392	0.0039
Hungary	–0,4	0.051	0.05927	0.2224
Malta	–0,6	–0.020	0.0012	0.9133
Netherlands	–0,7	–0.052	0.0826	0.3649
Austria	0,8	0.106	0.2484	0.07787
Poland	–0,3	0.015	0.0177	0.6799
Portugal	–1,8	–0.084	0.1254	0.2586
Romania	3,3	0.443	0.8232	0.0000
Slovenia	–1,8	–0.057	0.0468	0.4995
Slovakia	2,3	0.283	0.8041	0.0001
Finland	0,7	–0.004	0.0004	0.9477
Sweden	0,1	0.003	0.0006	0.9404
Iceland	1,	0.236	0.2892	0.0713
Norway	–2,2	0.159	0.0794	0.3749
Switzerland	0,3	0.050	0.4210	0.0224
Bosnia and Herzegovina	–4,1	–0.420	0.8619	0.0000
Montenegro	–3,3	–0.135	0.1135	0.2842
North Macedonia	–2,3	–0.274	0.4542	0.0162
Albania	–0,8	0.023	0.0321	0.5775
Serbia	–2,6	–0.201	0.4587	0.0155
Turkey	–1,8	–0.038	0.0204	0.6575
Kosovo	–1,1	–0.057	0.077	0.3813

*difference between 2022–2011
Source: the Author's calculation.

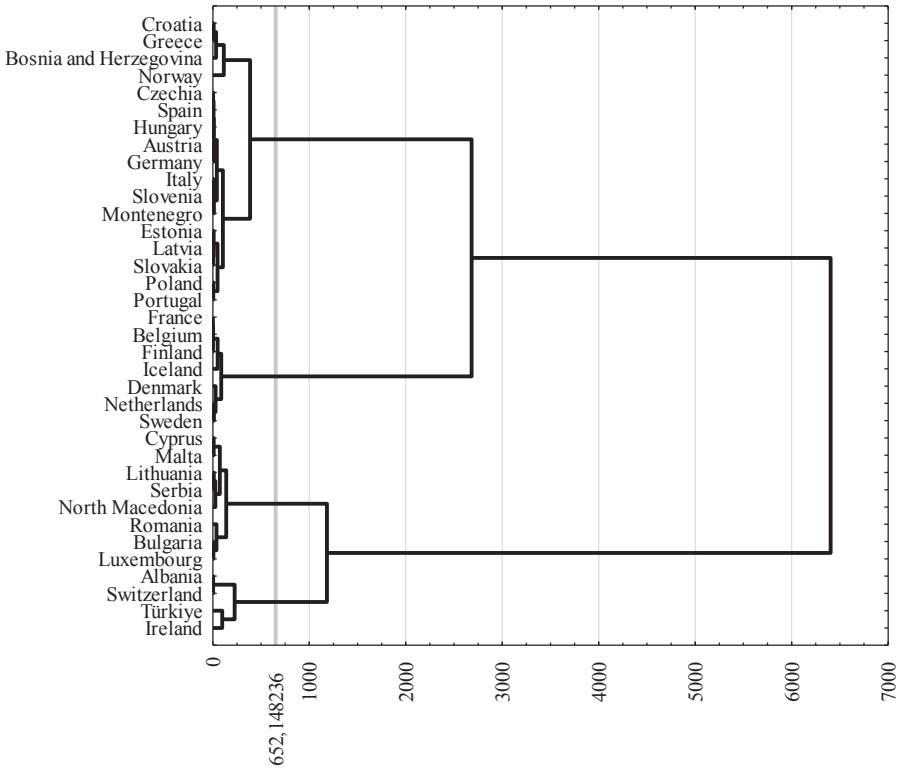

Fig. 2. Dendrogram of European countries by share of government household consumption expenditure in GDP in 2011–2022

Source: the Author's calculation.

Romania (3.3 p.p.), Slovakia (2.3 p.p.), and Switzerland (0.3 p.p.), (Table 1).

Statistically significant decreases in this expenditure as a share of GDP from 2011 to 2022 were observed in both Western and Eastern European countries, namely Denmark (by 4.8 p.p.), Ireland (7.7 p.p.), Bosnia and Herzegovina (4.1 p.p.), North Macedonia (3.3 p.p.), and Serbia (2.3 p.p.). In the remaining countries, the mentioned public expenditures remained stable.

The examination of the interrelationships between the share of government expenditures on household consumption and socio-economic indicators yielded the following results. Significant statistical correlations were found between the size of the share of government expenditures on household consumption and the following indicators: HI (Pearson correlation coefficient of 0.534), SDI (Pearson correlation coefficient of 0.522), HDI (Spearman rank correlation coefficient of 0.439), and SPI (Spearman rank correlation coefficient of 0.511). Thus, an increase in the share of government expenditures on household consumption is associated with an increase in the aforementioned indicators.

As a result of the Ward cluster analysis, European countries were divided into four groups according to the share of government expenditures on household consumption in GDP in 2011–2022. As a result of the Ward grouping, four clusters were obtained (Fig. 2).

The first group included France, Belgium, Denmark, Finland, Iceland, the Netherlands and Sweden. This group had the highest government expenditures on household consumption, ranging from around 22% of GDP in Denmark to 26% in Iceland (Fig. 3).

In the second group, five Eastern European countries, island countries, and Luxembourg were included. The share of the discussed category of government expenditures on household consumption in GDP in 2022 ranged from approximately 16% in

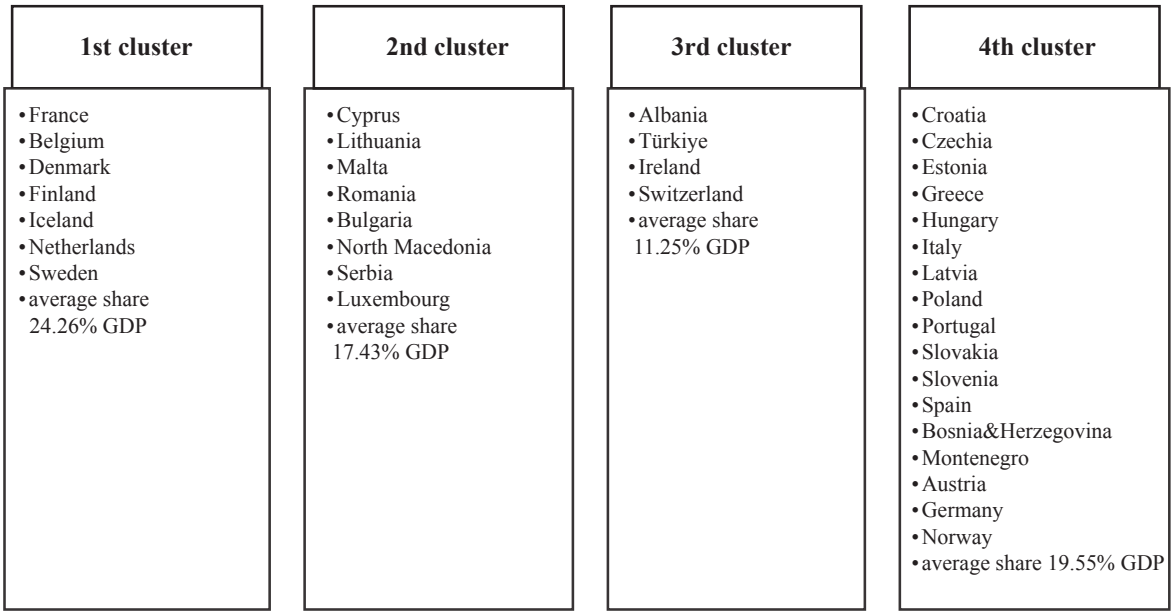

Fig. 3. Groups of countries by share of government expenditures on household consumption in GDP in European countries in 2011–2022

Source: the Author's calculation.

North Macedonia and Serbia to almost 19% in Cyprus and Malta.

The third group consisted of four countries. The share of government expenditures on household consumption in GDP in these countries was the lowest, ranging from 10.2% in Albania to 11.8% in Turkey.

In the fourth group, there were 17 countries from both Western and Eastern Europe, with the share of government expenditures on household consumption in GDP ranging from about 18% in Poland and Portugal to 21–22% in Spain, Slovakia, Croatia, Austria, and Germany.

Next, the analysis of relationships between the identified groups of countries and indicators describing various socio-economic aspects of life was conducted. Both the Kruskal-Wallis test and the median test allowed the conclusion that the level of analyzed indicators in the four groups is not equal (p <0.05). To determine which pairs significantly differ statistically, multiple mean rank comparisons were performed for all samples.

The conducted post-hoc tests (multiple mean rank comparisons for all samples) indicated statistically significant differences (p <0.05) in the levels of the Happiness Index and Social Progress Index between the 1st group and the 2nd and 4th groups. The 1st group had the highest shares of government expenditures on household consumption, and the inhabitants of these countries exhibited some of the highest Happiness Index scores and the highest Social Progress Index scores.

Regarding the Happiness Index, in the 1st cluster, it ranged from 6.661 in France to 7.804 in Finland. In the 2nd cluster, the respective index varied between 4.614 (Turkey) and 7.240 (Switzerland), while in the 4th cluster, it ranged from 5.633 (Bosnia and Herzegovina) to 7.315 (Norway), (Table 2).

Table 2. Multiple comparison test results of average ranks for all country groups and the level of the Happiness Index in 2022

Cluster	1	2	3
2	0.014868		
3	0.102454	1,000000	
4	0.009138	1,000000	1,000000

Kruskal-Wallis test: H (3, N = 36) = 12,34459 p = 0,0063

Source: the Author's calculation.

The Social Progress Index in the 1st cluster ranged from 86.04 in France to 90.54 in Finland. In the 2nd cluster, it varied from 72.74 (North Macedonia) to 87.48 (Luxembourg), and in the 4th cluster, it ranged from 71.23 (Bosnia and Herzegovina) to 90.74 (Norway), (Table 3).

Table 3. Multiple comparison test results of average ranks for all country groups and the level of the Social Progress Index in 2022

Cluster	1	2	3
2	0.007367		
3	0.223941	1.000000	
4	0.040336	1.000000	1.000000

Kruskal-Wallis test: H (3, N = 36) = 11,49463 p = 0,0093

Source: the Author's calculation.

Statistically significant differences in the levels of the Sustainable Development Goals Index between the 1st and 2nd clusters of countries were observed (Table 4). In the 1st cluster, this index ranged from 78.87 in Iceland to 86.76 in Finland. In the 2nd cluster, the analyzed index varied from 72.47 in North Macedonia to 77.72 in Romania. The 1st cluster had the highest values of the Sustainable Development Goals Index.

Similarly to the Sustainable Development Goals Index, statistically significant differences in the levels were observed between the 1st and 2nd clusters for the Human Development Index (Table 5). In the 1st cluster, the Human Development Index ranged from 0.903 in France to 0.959 in Iceland. In the 2nd cluster, the index varied from 0.770 in North Macedonia to 0.930 in Luxembourg.

Table 4. Multiple comparison test results of average ranks for all country groups and the level of the Sustainable Development Goals Index in 2022

Cluster	1	2	3
2	0.002817		
3	0.388531	1,000000	
4	0.717218	0,057344	1,000000

Kruskal-Wallis test: H (3, N = 36) = 13,19601 p = 0,0042

Source: the Author's calculation.

Table 5. Multiple comparison test results of average ranks for all country groups and the level of the Human Development Index in 2022

Cluster	1	2	3
2	0.015276		
3	0.747281	1,000000	
4	0,052393	1,000000	1,000000

Kruskal-Wallis test: H (3, N = 36) = 10,06540 p = 0,0180

Source: the Author's calculation.

DISCUSSION AND CONCLUSIONS

In recent years, numerous studies have investigated the impact of public expenditures on households. However, there is a lack of research on the relationship between public spending and indicators related to socio-economic development and the level and quality of life of the population. Both previous research by other authors and our own findings lead to the conclusion that factors beyond the share of government spending on household consumption influence the level and quality of life in a country. Scientific studies point to the role of GDP, as Bechtel [2018] pointed out that "a country-specific power

of GDP almost perfectly predicts HDI." These discoveries contribute to the ongoing discourse surrounding the essence of well-being [Bechtel and Bechtel 2020].

The paper by Kutasi and Marton [2020] explores the relationship between public spending and economic growth in EU countries. Utilizing data from the COFOG classification, the study examines various types of expenditures and their impact on GDP growth from 1996 to 2017. Three econometric models were employed to analyze the data: first-differences GMM, fixed effects panel, and OLS models. The findings suggest that social protection spending has a negative and statistically significant effect on GDP growth, similar to general public spending. However, spending on education and health has a positive impact on GDP growth. The study emphasizes the importance of optimizing the structure of public spending for more efficient economic development.

Antonelli and De Bonis [2019] investigate the efficiency of welfare policies in European countries and identify contributing factors. Using two-stage efficiency analysis, the study measures efficiency based on social protection expenditure using Free Disposable Hull and Data Envelopment Analysis techniques. The findings reveal that higher efficiency is associated with higher education and GDP levels, smaller population size, less selectivity in welfare systems, and lower corruption levels.

Cyrek [2019] examines income inequality and poverty, focusing on government intervention and social spending in EU countries. Using the DEA method and Malmquist index, the research compares social efficiency and identifies changes during the crisis period. The findings reveal variations in government spending efficiency for inequality reduction, while poverty alleviation shows no such correlation. Additionally, social models differ between Southern and Northern European countries, with the former focusing on inequality reduction and the latter on poverty alleviation. Efficiency decreases during the crisis mainly affected poverty reduction, indicating negative impacts on the poor. Institutional reforms positively influenced efficiency, while current public spending usage led to losses.

Earlier research has focused on the impact of public expenditures on the well-being of society, but existing studies have yielded mixed results. Some suggest that government consumption may decrease life satisfaction [Di Tella and MacCulloch 2005, Bjørnskov et al. 2007], while others find no significant effect [Veenhoven 2000, Ouweneel 2002]. Specific types of government expenditures also yield conflicting evidence. Social security expenditures, for example, do not show a significant correlation with well-being. However, generous welfare spending and higher unemployment benefits have been linked to increased national well-being [Radcliff 2001, Di Tella et al. 2003]. Health expenditures also positively influence subjective well-being when considering respondents' health status [Kotakorpi and Laamanen 2010]. Hessami [2010] demonstrated that well-being is higher in countries where a large share of the budget is spent on education. Overall, the literature presents ambiguous findings regarding the impact of different public spending components on well-being. Our own study confirms these findings, showing that both in countries with the highest and lowest share of government expenditures on household consumption, indicators describing the level and quality of life of inhabitants are at a similar level. For instance, in Nordic countries with high government expenditure and Switzerland with low government expenditure, the indicators depicting the level and quality of life show comparable results.

In our own research, we also found significant differences in the Sustainable Development Goals Index between richer and poorer European countries. Higher levels of indicators were achieved by countries in the richer part of Europe, but not necessarily with higher levels of government spending on household consumption (e.g., Ireland, Switzerland). Over the past few decades, there has been an ongoing tension between socio-economic development and ecological sustainability [Jorgenson 2010, Rich, 2014]. Spaiser et al.'s [2016] findings have quantified this inconsistency, demonstrating that economic growth can fulfill socio-economic goals while hindering environmental goals. However, certain models identify factors, such as health programs and government spending for socio-economic development, and renewable energy for ecological sustainability, that can avoid triggering conflicts between incompatible SDGs.

Studies outside Europe have shown the impact of government spending on economic development indicators. For instance, research conducted in Saudi Arabia [Haque and Khan 2019] reveals that a 1% increase in total gov-

ernment expenditure leads to a significant 10% point rise in the Human Development Index (HDI). Furthermore, the study highlights that investment in education has the most substantial positive impact on HDI. Conversely, the research identifies a negative relationship between health expenditure and economic growth.

Another study, the paper by Perovic and Golem [2010], combines data from surveys about happiness and macroeconomic data and analyzes the effects of macroeconomic variables on self-reported happiness in transition countries, focusing particularly on the impact of government size on the economy. Using international data on the reported happiness levels of thousands of individuals, the study finds that government expenditure as a percentage of gross domestic product positively and significantly influences happiness in a set of thirteen transition countries.

SUMMARY

In the conducted research, it was demonstrated that significant changes in the percentage of final consumption expenditure of the general government in GDP occurred in thirteen out of thirty-six European countries from 2011 to 2022. Increases in these expenditures were observed in Switzerland, Slovakia, Romania, Luxembourg, Germany, Estonia, and Bulgaria. On the other hand, reductions in the percentage of final consumption expenditure of the general government in GDP occurred in Serbia, North Macedonia, Bosnia and Herzegovina, Ireland, and Denmark.

European countries can be categorized into four groups based on the percentage of final consumption expenditure of the general government in GDP from 2011 to 2022. The first group includes households with the highest government support, such as France, Belgium, the Netherlands, and Nordic countries like Denmark, Finland, Iceland, Sweden, and Norway. The lowest government support was observed in households from Albania, Turkey, Ireland, and Switzerland.

Statistically significant differences in the level of socio-economic development indicators did not appear between the extreme groups, i.e., those with the highest and lowest shares of government expenditures on household consumption, but rather between groups encompassing countries from the wealthier part of Northern and Western Europe and the poorer part of Eastern and Southern Europe. Most countries with the highest government expenditures on households also had the highest socio-economic development indicators. Conversely, countries with lower government spending on private consumption in households showed lower socio-economic development indicators.

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WYDATKI RZĄDU NA KONSUMPCJĘ GOSPODARSTW DOMOWYCH: POZIOM, ZMIANY I ICH ZWIĄZEK Z WSKAŹNIKAMI ROZWOJU SPOŁECZNO-GOSPODARCZEGO W KRAJACH EUROPEJSKICH

STRESZCZENIE

Cel: Celem tego artykułu jest zbadanie zmian w wydatkach rządowych na konsumpcję gospodarstw domowych w krajach europejskich oraz związku tych wydatków z wskaźnikami społeczno-ekonomicznymi. **Metody**: Badanie opiera się na analizie danych z 36 krajów europejskich z wykorzystaniem bazy danych

Eurostat oraz różnych rankingów, takich jak Indeks Szczęścia, Indeks Rozwoju Ludzkiego, Cele Zrównoważonego Rozwoju i Indeks Postępu Społecznego. Przeprowadzono analizę trendów zmian wydatków rządowych na konsumpcję gospodarstw domowych oraz skupiono się na wyjaśnieniu związku między tymi wydatkami a wskaźnikami społeczno-ekonomicznymi. **Wyniki**: W badanych krajach obserwowano istotne zmiany w udziale wydatków rządowych na konsumpcję gospodarstw domowych w latach 2011–2022. Niektóre kraje zwiększyły te wydatki, podczas gdy inne je zmniejszyły. W wyniku analizy skupień wyróżniono cztery grupy krajów na podstawie udziału wydatków rządowych na konsumpcję gospodarstw domowych w PKB. **Wnioski**: W badanych krajach nie stwierdzono bezpośredniego związku między poziomem wydatków rządowych na konsumpcję gospodarstw domowych a wskaźnikami społeczno-ekonomicznymi. Zamiast tego, zaobserwowano zróżnicowanie w rozwoju społeczno-ekonomicznym między różnymi grupami krajów, niezależnie od poziomu wydatków rządowych na konsumpcję gospodarstw domowych.

Słowa kluczowe: wydatki rządowe, konsumpcja gospodarstw domowych, wskaźniki społeczno--gospodarcze, kraje europejskie, trendy

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DETERMINANTS OF FEMALE ENTREPRENEURSHIP IN POLAND

Joanna Rakowska✉, Patrycja Rupert

Warsaw University of Life Sciences, Poland

ABSTRACT

Aim: Female entrepreneurship is a still-untapped economic potential. To trigger it, it is necessary to better recognize barriers to its development. Thus, the aim of the research was to identify the motives that make women start their own businesses, the reasons why they postpone or decline such decisions, the barriers that they encounter when running a business, and their priorities concerning professional careers and family. **Methods:** Applied methods include an e-mail survey and direct interviews, both using a questionnaire. The gathered data was processed using standard qualitative data analysis tools and descriptive analysis. **Results:** Women decide on their own business mainly because of negative experiences of being an employee and, to a lesser degree, because of a lack of satisfactory job offers or a lack of job offers at all. However, they often postpone starting their own business because of subjective reasons: the feeling that they lack experience, the lack of self-confidence, the fear of failure, and objective ones: lack of capital. The identified barriers in women running businesses are mainly universal, not gender-related, i.e., high taxes, problems with finding employees, and frequent changes in legal and administrative regulations. Limited time devoted to family is the only gender-related barrier. However, a considerable share of respondents claims that there are no bottle-necks to female entrepreneurship in Poland. **Conclusions:** To trigger the potential of female entrepreneurship, we recommend two types of actions: training, mentoring and promoting success stories aimed at decreasing the subjective barriers to women starting businesses and actions aimed at diminishing the universal, not gender-related obstacles in running businesses in Poland.

Key words: female entrepreneurship, determinants, Poland
JEL code: J16

INTRODUCTION

Entrepreneurship has been a long-studied and discussed phenomenon, broadly acknowledged as a driver of economic and social development in many regional and national contexts. However, female entrepreneurship, also called women entrepreneurship, has a much shorter history, connected with social and cultural changes triggering gender equality and enabling women to take different social roles and become active actors in the labor market.

Growing in number and contributing to social and economic development more and more, female entrepreneurs in the European Union are still a minority compared to businessmen [Estrin and Mickiewicz 2011, Rugina 2018]. As the European Commission informs, in 2021, there were nearly 25 million self-employed workers in the EU, of which about 8.2 million were women [European Commission 2022]. This relation is also true at the national level, as female self-employment rates were lower than male self-employment rates in all EU member states, including Poland. That is why

Joanna Rakowska https://orcid.org/0000-0001-5135-6996; Patrycja Rupert https://orcid.org/0009-0000-0599-8541

✉joanna_rakowska@sggw.edu.pl

female entrepreneurship is considered a still-untapped potential that needs support in overcoming gender-related barriers to fully contribute to economies [European Investment Bank 2022] and meet the requirements of Sustainable Development Goals 2030, encompassing gender equality. As the OECD and the European Commission [2021] highlight, "the longstanding gender gap in entrepreneurship represents a missed opportunity for innovation, social and economic value creation, and job creation". To transform the potential of female entrepreneurship into an economic driving force, governments and international institutions must monitor the established and emerging determinants.

Although the first and seminal studies on female entrepreneurship were published in 1976 [Schwartz 1976] and in 1986 [Bowen and Hisrich 1986], women entrepreneurship evolved as an independent field of studies much later – at the beginning of the 21st century – when researchers recognized entrepreneurship as a "gendered phenomenon" [Jennings and Brush 2013]. Growing all over the world significantly, women entrepreneurship has attracted even more attention over the last two decades [Sarri and Trihopoulou 2005, Aidis et al. 2008, Saumik and Vengadeshvaran 2013, Ramadani et al. 2015, Alsos et al. 2016, Cutillo and Centra 2017, Serafimova and Petrevska 2018]. Still, due to complex conditions varying between countries and regions, women entrepreneurship is considered understudied [Minniti and Naudé 2010, Loza 2011, Brush and Cooper 2012, Pogesi et al. 2016, Santos et al. 2018, Bastida 2021]. It requires further investigation [Henry et al. 2016, Jacob et al. 2023] to provide good recognition of the matter as a basis for developing and implementing evidence-based policies aimed at supporting female entrepreneurship [European Commission and OECD 2017, European Commission 2020b, European Investment Bank 2022, Martínez-Rodríguez 2022].

Poland is one of the Central and East European countries that underwent a transition from the centrally planned socialist economy to the free market, subsequently joining the European Union and its single market. Entrepreneurship has been a crucial factor in those changes. Although women's participation in entrepreneurship has significantly advanced in Poland since that time, gender disparities in entrepreneurship itself and in the labor market persist – in 2022, the Gender Equality Index ranked Poland 22nd in the EU [European Institute for Gender Equality 2022].

Women represent more than half of the Polish population, but they constitute the minority of entrepreneurs [European Commission 2022, Global Entrepreneurship Monitor 2022]. Over the recent years, the index of total early-stage entrepreneurial activity for the female working-age population in Poland has been falling continuously from a higher than the EU average in 2017 to a lower than the EU average in 2018 and the subsequent years. In 2018, the index for Poland equaled 4.46 and the EU 5.65; in 2019, Poland 5.09 and the EU 7.52; in 2020, Poland 2.36 and the EU 6, and in 2021, Poland 1.65 and the EU 6.9 [European Commission 2018, 2019, 2020a, SME Performance Review 2022/2023]. Despite these negative trends, female entrepreneurship in Poland is said to have tremendous potential, as more than 50% of the unemployed, economically inactive or working women would consider starting their own business [Jancewicz 2014].

Several studies on female entrepreneurship in Poland have been carried out so far, giving insight into this important matter [e.g. Lituchy and Reavley 2004, Wasilczuk and Zieba 2008, Borowska 2013, Gaweł 2013, Jancewicz 2014, Leszczyński 2016, Piątek 2018, Gawel and Głodowska 2021, Gaweł and Mroczek-Dąbrowska 2022]. However, the authors conclude on the necessity of continuing the research as economic and social conditions for female entrepreneurship evolve, updating the previous research and generating new questions on this matter. To fill this gap and contribute to the knowledge of women entrepreneurship, this study aims to answer the following research questions (RQ):

RQ_1: What motives drive women to become entrepreneurs?

RQ_2: What makes women postpone or decline the decision to start their own business?

RQ_3: What barriers do women encounter when being entrepreneurs?

RQ_4: What are their priorities concerning professional careers vs family lives?

METHODS

The literature provides many definitions of women entrepreneurship, also called female entrepreneurship. Based on the results of the literature analysis by Bastida [2021], this study applies the definition of women entrepreneurs as businesswomen who have their own businesses, including self-employment.

The empirical part of the paper was based on qualitative data from field research carried out in 2023 in two different ways. First, the questionnaire, including 30 questions, was distributed to 310 women entrepreneurs from Wołomin County by e-mail. We retrieved the e-mail addresses from the Central Registration and Information of Business (CEIDG) database, which is a public resource. The main criteria for selecting respondents to the survey were: (1) the gender of the owner, (2) the location of the business in Wołomin County and (3) the ongoing business status. The authors received 13 filled-out questionnaires, which generated a 4.2% response rate.

Due to the insufficient response rate of the e-mail survey, researchers carried out direct interviews with the women entrepreneurs using the same set of questions. The addresses of enterprises were retrieved from CEIDG using the same selection criteria as in the first stage of the survey. 24 out of 33 invited women entrepreneurs took part in the interview, making the response rate 72.7%. Altogether, the survey provided 37 responses from female entrepreneurs. The collected field research data was processed using the standard qualitative data analysis methods and descriptive analysis.

RESULTS

97% of the enterprises examined in the survey can be classified as micro-enterprises, while the remaining 3% fall under the category of small enterprises, i.e., denoting their employment of a workforce ranging from 10 to 49 individuals. A substantial proportion, accounting for 95%, are businesses of the service sector and only 5% of the industrial sector. Most of the surveyed women-owned businesses were hairdressing and beauty salons, accounting firms, commercial enterprises, florists, insurance agencies, and healthcare services.

The demographic analysis of the cohort under examination reveals a notable prevalence of female entrepreneurs aged 36 to 45 (38% of respondents), closely followed by women aged 46 to 55, constituting 32% of the surveyed population. However, the biggest share (accounting for 41%) of respondents started their business when they were between 26 to 35 years of age, and 32% between the ages of 36 to 45. An additional 19% of respondents started their businesses at the age of between 18 to 25 years, while a mere 8% ventured into entrepreneurship between the ages of 46 to 55. Remarkably, the data unveils a complete absence of entrepreneurial pursuits beyond the age of 55.

A substantial 65% of surveyed female entrepreneurs have been running their businesses for a period exceeding five years.

The overwhelming majority of the respondents had secondary and tertiary education (constituting 38 and 43% of the participant pool, respectively). Among the most frequently mentioned profiles of studies completed by the respondents were: economics, management, cosmetology, psychology, and law. In the case of 60% of the surveyed female entrepreneurs, their education was consistent with the profiles of their businesses, while in the case of 16%, only partially, and in 24%, there was no such compliance.

Before starting their own business, the largest part of the respondents worked in other enterprises (64%), were studying (5%), or supported running a family business (3%). But another 8% were unemployed, and also 8% indicated a different status, such as, e.g., maternity leave.

Among the respondents who were professionally active before starting their own business, 51% declared that their previous job had a similar profile of activity, and 14% said that it partially overlapped with the current one. However, as many as 35% of respondents have now been running businesses of a completely different kind than their previous jobs.

When asked about the reasons for resigning from their previous jobs, the women most frequently pointed at: low earnings (23%), lack of development opportunities or feeling underappreciated (16% each), and unsuitable work conditions (13%). Other equally frequently mentioned reasons included professional burnout or bankruptcy of the company (each 6% of responses), as well as the need for change and

dismissal or lack of development prospects (each 3% of responses).

When asked about the motives behind starting their own business, 32% of respondents indicated the need for independence. The possibility of combining work with passion was an important motive for 22% of respondents, and fulfilling their ambitions for 19%. The feeling of underestimation and the lack of development opportunities (5%) or too low pay (5%) at previous jobs were also indicated as reasons for starting a business. As respondents explained, "In your own company, you can independently shape the atmosphere, the pay, or decide on new challenges."

When posed with the query, "Do you believe that you have postponed starting your own business for too long?" 46% of the participants responded in the affirmative. As the reasons for postponing the decision to start a business, women most often indicated the lack of sufficient experience and the desire to gain it (32%), lack of self-confidence (27%), lack of the appropriate amount of capital (23%), unfavorable attitudes and lack of support from their families (5%).

The most frequently mentioned barriers that women in the surveyed population had been facing were high taxes imposed on the company (30%), problems with finding suitable employees (22%), problems in administrative offices, and constant changes in legal and tax regulations (3% each). On the other hand, difficulties in reconciling work and personal life were indicated by 19% of the surveyed women. The 20% share of respondents who stated that they did not experience any barriers is also significant.

Family life is very important to the respondents. When asked whether they agreed with the statement: a successful professional career is more important than success in family life, 59% disagreed, and 24% answered that they rather disagreed. Only a minority of 14% agreed, and 3% rather agreed with the statement that a professional career is more important than family life. The surveyed women were also asked if they had children. As this question could be perceived as sensitive, it was not mandatory, but all the surveyed women answered it (none of them chose the option "I do not want to answer this question"). The research shows that 78% have children, including 44% who have 2 children, 22% who have 1 child and 16% who have 3 children.

At the same time, as many as 68% of the surveyed group indicated that running their own business reduced the amount of time they devote to the family. Among the surveyed group, more than half (57%) indicated that they worked between 40 and 50 hours a week, nearly 25% between 51 and 60 hours, and 8% even more than 60 hours a week. In the case of a micro-enterprise (97% of the pool), the owner takes over several positions, which intensifies the amount of work she has to do, and the time devoted to it increases while the time devoted to the family shrinks even more.

According to the surveyed group, women avoid running a business because they lack self-confidence (54%), fear failure (32%), or lack capital (11%).

Despite the barriers that women entrepreneurs face and the amount of time they need to devote to running a business, as many as 68% of women participating in the survey agreed or rather agreed that running a business is the best way to achieve professional success. Among the advantages, they most often pointed to financial independence (38%), flexible working time (35%) and the possibility of pursuing their own professional aspirations (14%) and ideas (8%), as well as the lack of superiors (5%). But they also mentioned no need to meet the imposed expectations of others. The independent setting of priorities and rules that the woman entrepreneur wants to follow are only some of them.

Women who started running their enterprises before 2020 were asked if the pandemic had affected their business. Among the surveyed women, 57% gave an affirmative answer, indicating the reduced number of customers (48%) and the resulting financial problems (29%). The respondents also experienced a change in the form of doing business (10%), which was mainly manifested in the transfer of the offered services online or the introduction of remote work. It is worth noting that in the opinion of 5% of the surveyed, the changes that have taken place on the market due to the COVID-19 pandemic have had a positive impact on the development of their businesses. The answers were strongly related to the type of the business: businesses requiring direct contact with the client experienced difficulties during the pandemic, and they made

a majority, while those that could provide their services online stated a positive impact of the pandemic on their development, but they were a minority.

The last question in the survey form was an open question, which concerned the respondents' own observations on female entrepreneurship in Poland. The answers indicated that. "Women in Poland do not have a high enough self-esteem to dare to start their own business"; "They are often assigned the role of a "Polish mother', who should sacrifice herself for the family and always put it in the first place"; "Women are as entrepreneurial as men. Unfortunately, women face many obstacles in accessing jobs, and unemployment among women is higher, although the number of women with higher education is increasing. The solution may be self-employment"; "The lack of self-confidence and belief in stereotypes about women is a problem"; "The unfavorable opinion of society is the main bottleneck".

DISCUSSION

The findings on the size of surveyed enterprises confirm that female entrepreneurship is represented mostly by micro-businesses, less by small ones, mostly in the service sector in both cases. This is in line with the EU/OECD general characteristics of female entrepreneurship, stating that women owned and managed businesses are less oriented towards creating substantial employment for others [European Commission and OECD 2017]. As the pool included women only, the study findings cannot be referred to the OECD's conclusion that in Poland, the share of self-employed women who employ others is like that represented by male entrepreneurs [OECD and European Commission 2021], but it indicates a topic for further studies.

The biggest share of surveyed women entrepreneurs had tertiary education, which can be extended further by findings from another study proving that self-employed women in Poland are more likely than self-employed men to have completed tertiary education [OECD and European Commission 2021].

Most surveyed women entrepreneurs had had other jobs before starting their current businesses, and that earlier experience was often a reason for becoming an entrepreneur rather than continuing to be an employee. It refers directly to occupational choice theory, assuming that anyone who is to make an occupational choice has the option to become either an entrepreneur or an employee.

Findings confirmed that women had different motivations to start their own businesses; however, those categorized as "driven by desire" prevailed. The "driven by desire" motives arise from entrepreneurs' expectations and preferences, such as independence, self-fulfillment, family-related factors, etc. [Bastida 2021]. A much smaller share of respondents indicated motives for starting a business classified as "driven by force", i.e., arising from previous work-related factors such as job dissatisfaction, lack of opportunities for professional development, unsatisfactory earnings, inconvenient working conditions, etc.

Other theoretical approaches refer to these motivations as "necessity-driven" or "opportunity-driven" [Gawel 2023]. In this context, opportunity-driven entrepreneurship prevails in the surveyed group.

Considering the constraints to women entrepreneurship, the study revealed both findings confirming the previous state of knowledge, as well as new ones. More than half of women entrepreneurs pointed at quite universal – not gender-related barriers. Nearly 20% of respondents confirmed that running a business limits their private time or time they have for their families, which is an already well-recognized bottleneck to female entrepreneurship. But at the same time, the remaining 20% highlighted that they do not experience any barriers in running their businesses.

CONCLUSIONS

The determinants conditioning female entrepreneurship can be divided into two groups: those that women experience before starting their own business and those that accompany running the business.

The findings revealed that among the motives for starting a business are the disadvantages of being an employee, the lack of adequate job offers, and the expected advantages of being self-employed. The drawbacks of being an employee include mainly low pay, underestimation, lack of development opportunities,

and unsuitable working conditions. The surveyed women entrepreneurs perceive self-employment as a means to get occupational independence and avoid those negative phenomena, but also as a way to combine work with passion and fulfill ambitions. However, the decisions to start a business are often postponed due to the feeling that women lack experience and want to gain it, the lack of self-confidence, the lack of capital and – in a few cases – an unfavorable attitude of families. Fear of failure also appeared to be an important obstacle to women entrepreneurship.

When running a business, most surveyed women entrepreneurs encounter universal, not gender-related barriers, including high taxes, problems with finding employees, and frequent changes in legal and administrative regulations, especially those regarding taxes. It is worth highlighting that 1 in 5 female entrepreneurs declare that they do not experience any barriers in running their businesses. A similar share claims that being businesswomen, they devote less time to their families, but they can manage their working time flexibly. In conclusion, most women entrepreneurs consider running a business as a more desirable occupational choice than being employed, allowing most of them to balance work and life due to independence resulting from self-employment.

Based on the findings, it can be concluded that diminishing the universal, not gender-related barriers will strongly support female entrepreneurship. However, actions aimed at decreasing the subjective barriers to women starting businesses are recommended. They should include entrepreneurship training, start-up guidance, and promoting good practices or success stories addressed to prospective women entrepreneurs.

Further studies should investigate the differences and similarities in the determinants of female entrepreneurship in a territorial context, i.e., in big cities, towns, and rural areas, in order to elaborate effective location-based policies supporting female entrepreneurship at the national and local levels.

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DETERMINANTY PRZEDSIĘBIORCZOŚCI KOBIET W POLSCE

STRESZCZENIE

Cel: Przedsiębiorczość kobiet to wciąż niewykorzystany potencjał gospodarczy i niedostatecznie zbadana dziedzina. Aby mogła ona stać się w pełni efektywnym motorem napędowym gospodarki, konieczne jest lepsze rozpoznanie barier jej rozwoju. Dlatego celem badania było zidentyfikowanie motywów, które skłaniają kobiety do zakładania własnych firm, powodów odkładania lub odrzucania takich decyzji, barier, jakie napotykają w prowadzeniu biznesu, a także priorytetów dotyczących ich kariery zawodowej i życia rodzinnego. **Metody:** Zastosowane metody obejmują ankietę e-mailową oraz wywiady bezpośrednie, z wykorzystaniem kwestionariusza ankiety. Zebrane dane zostały przetworzone przy użyciu standardowych narzędzi analizy danych jakościowych oraz analizy opisowej. **Wyniki:** Kobiety decydują się na własny biznes głównie z powodu negatywnych doświadczeń związanych z byciem pracownikiem, w mniejszym stopniu z powodu braku satysfakcjonujących ofert pracy lub braku ofert w ogóle. Często jednak odkładają założenie własnej firmy z powodów subiektywnych: poczucia braku doświadczenia, braku pewności siebie, lęku przed porażką oraz obiektywnych: braku kapitału. Z kolei bariery w prowadzeniu działalności gospodarczej mają głównie charakter uniwersalny, niezwiązany z płcią. Są to wysokie podatki, problemy ze znalezieniem pracowników, częste zmiany przepisów prawnych i administracyjnych. Ograniczony czas poświęcany rodzinie to jedyna bariera związana z płcią, jednak znaczna część respondentek twierdzi, że w Polsce nie ma barier dla przedsiębiorczości kobiet. **Wnioski:** Aby uruchomić potencjał przedsiębiorczości kobiet, rekomendujemy działania mające na celu zmniejszenie subiektywnych barier podejmowania działalności gospodarczej przez kobiety poprzez szkolenia, mentoring i promowanie przykładów sukcesu oraz zwalczanie uniwersalnych, niezwiązanych z płcią barier w prowadzeniu działalności gospodarczej w Polsce.

Słowa kluczowe: przedsiębiorczość kobiet, determinanty, Polska

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CONDITIONS OF CHANGES IN THE REGIONAL SPECIALIZATION OF ANIMAL PRODUCTION IN POLAND

Elżbieta Jadwiga Szymańska[1]✉, Robert Mroczek[2], Agnieszka Tłuczak[3]

[1] Warsaw University of Life Sciences – SGGW, Poland
[2] Institute of Agricultural and Food Economics National Research Institute, Poland
[3] University of Opole, Poland

ABSTRACT

Aim: The study aimed to identify regional specialization and changes in competitiveness in the field of animal production in Poland. **Methods:** The analysis covered statistical data of the Central Statistical Office from 2010–2021 on a national scale and in individual voivodeships. The study used a comparative analysis of animal production in regional terms. In order to determine the specialization of the region and to analyze changes in competitiveness over time, the classic method of Shift-Share Analysis (SSA) was used. **Results:** Major changes are taking place in Poland in the stock of farm animals and the production of animals for slaughter. In the years 2010–2021, the pig stock decreased drastically, and the stock of cattle, especially for fattening and poultry, increased. Changes in livestock stock contributed to an increase in beef cattle and poultry production and a decrease in the production of live pigs. **Conclusions:** There is specialization in Poland, and the concentration of production of the most important livestock species in individual voivodeships is increasing. Specialization and concentration processes allow for more effective use of farm resources and greater competitiveness of regions. However, the accelerating concentration of production may threaten the sustainable development of agriculture and negatively affect the natural environment. Therefore, further research on the impact of specialization and concentration of animal production on food security and the natural environment is recommended.

Key words: production, region, concentration, pigs, beef cattle, poultry, competitiveness
JEL codes: Q12, O18, R11

INTRODUCTION

In Poland, animal production is of great importance in the system, guaranteeing the country's food security. It is one of the most important divisions in the total agricultural commodity production structure, although its share has decreased in recent years. Meat production fluctuates over time due to the size and structure of meat consumption, livestock purchase prices, and the retail prices of meat and meat products [Bąk-Filipek 2011].

Animal production in Poland is regionally differentiated. Internal conditions influence changes in agriculture, including natural-environmental, organizational-economic, and external conditions [Pepliński 2019]. Natural and environmental conditions determine agricultural land use and primarily affect the

Elżbieta Jadwiga Szymańska, https://orcid.org/0000-0001-7686-1243; Robert Mroczek, https://orcid.org/0000-0003-2238-3885; Agnieszka Tłuczak, https://orcid.org/0000-0001-6217-8822;

✉elzbieta_szymanska@sggw.edu.pl

quantity and quality of plant feed supplied. In turn, economic and organizational conditions affect the profitability of production. The regionally diversified livestock population is also significantly affected by the agrarian structure and labor resources, which determine the choice of a more or less labor-intensive type of rearing [Dziewulska 1994].

Historical conditions, as well as traditions and experience in running individual lines of production, shape the structure of farms and also play an important role in the regional differentiation of animal production. The competitive environment is also important (for example, successful production by neighboring farms) and the institutional environment, i.e., efficiently functioning organizations in the agricultural environment that support agricultural producers [Olszańska 2017].

Changes taking place in Polish agriculture, including animal production, are significantly influenced by external conditions shaped by the Common Agricultural Policy (CAP), the World Trade Organization (WTO), and capital, raw material, and product markets [Kopiński 2015]. After Poland's integration with the EU, financial support for agricultural production under various aid programs has increased. Apart from direct payments from the 1st pillar of the CAP for the livestock production sector, the most significant funds were allocated to the measure "Investments in a farm" under SAPARD, then from the SOP "Agriculture" in 2004-2006 and the measure "Modernization of farms" in RDP 2007-2013 [Szymańska 2006, Bułkowska 2011].

The process of concentration of animal breeding is one of the key factors influencing the reduction of unit production costs. It affects the profitability and competitiveness of a given production. In general, the processes of concentration of animal production are intensifying, which results in the deepening of regional diversification of animal production. Some regions become leaders in a given production, while others are marginalized [Strijker 2008, Rybicki 2009, Leeuwen et al. 2010, Bartova and Konyova 2015, Ragkos et al. 2015, Tłuczak 2018].

The specialization and concentration of production contribute to the increase in regional competitiveness. Łaźniewska and Gorynia [2012] defined regional competitiveness as the sustainable ability to compete with other regions, ensuring sustainable economic development. The regional dimension of competitiveness consists of two essential elements: interregional differentiation and market size. In the area of agriculture, Kołodziejczak [2010] defined regional competitiveness as the ability of a region to use its environmental, social, economic, and social institutional resources to achieve and maintain a competitive position in the country's market in terms of the contribution of its agriculture to the national economy. Competitiveness is, therefore, the ability of farms and regions to achieve success and gain an advantage over other entities (regions) fighting to earn their place in the market [Meyers and Ziółkowska 2013, Józwiak 2014]. In agricultural and economic-agricultural sciences, competitiveness is treated as the pursuit of reducing production costs and improving the efficiency of using production potential [Józwiak 2011].

The consequences of changes in animal production are multi-faceted and multi-dimensional, affecting changes in the state of the environment. In animal production, the organization of production is extensive (specialization) with a simultaneous increase in its intensity (concentration), which may result in an increase in environmental pressure in areas with a high concentration of animal production, leading, among others, to the deterioration of the quality of surface and groundwater [Fotyma et al. 2010, Kołodziejczak 2020].

In recent years, the deepening of regional diversification of agriculture has been observed as a result of strongly occurring processes of production concentration and polarization, resulting from the desire to improve the profitability of farming [Ziętara 2009]. Due to the importance of changes in the regional diversification of animal production, the study attempts to explain the reasons for the spatial diversification of individual animal species and the changes taking place in this respect. The aim of the study was to identify regional specialization and changes in the level of competitiveness in the field of animal production in Poland.

METHODS AND DATA SOURCES

The analysis covered the statistical data of the Central Statistical Office from 2010-2021 on a national and individual voivodeship scale. In the study, a compara-

tive analysis was made using tabular and graphical summaries. In order to determine the specialization of the region and to analyze changes in competitiveness over time, the classic method of shift-share analysis (SSA) was used. It was described by Dunn [1960] and then by Perloff et al. [1960]. The classic shift-share equation for variable increments takes the form:

$$x^*_{ri} - x_{ri} = x_{ri}\, tx_{..} + x_{ri}\,(tx_{.i} - tx_{..}) + x_{ri}\,(tx_{ri} - tx_{.i}) \quad (1)$$

where:

$$tx_{..} = \frac{\sum_{r=1}^{R}\sum_{i=1}^{S}(x^*_{ri} - x_{ri})}{\sum_{r=1}^{R}\sum_{i=1}^{S}x_{ri}};\ tx_{.i} = \frac{\sum_{r=1}^{R}(x^*_{ri} - x_{ri})}{\sum_{r=1}^{R}x_{ri}};$$

$$tx_{ri} = \frac{x^*_{ri} - x_{ri}}{x_{ri}}$$

x^*_{ri} – observations of the analyzed variable X in the r-th region and i-th group of the cross-sectional division in the final period,

x_{ri} – observations of the analyzed variable X in the r-th region and i-th group of the cross-sectional division in the initial period;

In the following years, the indicated equation was modified and improved by other authors, e.g., Houston [1967], Berzeg [1978], Fothergill and Gudgin [1979], Stevens and Moore [1980], and Arcelus [1984].

By dividing both sides of equation by (1) sides by *x*ri, the relationship between the growth rates was obtained:

$$tx_{ri} = tx_{..} + (tx_{.i} - tx_{..}) + (tx_{ri} - tx_{.i}) \quad (2)$$

The use of SSA analysis allows the decomposition of the total change of a localized variable into three components [Suchecki 2010, Trzpiot et al., 2013, Tłuczak 2016]:

$tx_{..}$ – national (global) regional growth factor;

$tx_{.i} - tx_{..}$ – sectoral (structural) factor of regional growth;

$tx_{ri} - tx_{.i}$ – local (geographical, competitive, differentiating) growth factor in the i-th sector of the r-th region.

In 1972, Esteban-Marquillas [1972] proposed introducing a new element into equation (1), the so-called homothetic variable:

$$\hat{x}_{ri} = x_{ri}\,\frac{x_{r.}}{x_{..}} \quad (3)$$

Equation (1), after modification byEsteban-Marquillas, took the form:

$$x^*_{ri} - x_{ri} = x_{ri}\, tx_{..} + x_{ri}\,(tx_{.i} - tx_{..}) + \hat{x}_{ri}\,(tx_{ri} - tx_{.i}) + (x_{ri} - \hat{x}_{ri})(tx_{ri} - tx_{.i}) \quad (4)$$

The homothetic variable introduced by Esteban-Marquillas determines the level of the i-th variant of the phenomenon that the r-th object would have if the structure of the phenomenon in this object were identical to the national structure, and it results from the relationship between the position of competitiveness and the effect of structural changes. In addition, replacing the value of x_{ri} with the effect of changes in the position of competitiveness cleared the impact of local structural changes [Herzog and Olsen 2006]. The remaining, unexplained part of the actual changes in the phenomenon is called the allocation effect:

$$a_{ri} = (x_{ri} - \hat{x}_{ri})(tx_{ri} - tx_{.i}) \quad (5)$$

The component of the allocation effect a_{ri} indicates the specialization of the rth object in the sense of concentration in those variants of the phenomenon $(x_{ri} - \hat{x}_{ri})$ in which it is the most competitive $(tx_{ri} - tx_{.i})$. The value $\hat{x}_{ri}(tx_{ri} - tx_{.i})$ is considered an indicator of the competitive advantage (or gap) of the ith sector in the rth region in relation to the reference area [Ray 1990].

The component $x_{ri}(tx_{ri} - tx_{.i}) + (x_{ri} - \hat{x}_{.i})\ (tx_{ri} - tx_{.i})$ is positively related to agricultural production in a given sector when a given agricultural sector develops faster than the entire agricultural production and the region specializes in a given sector [Woźniak, 2010].

It is possible that the region's specialization does not occur in the initial year $(x_{ri} - \hat{x}_{.i} < 0)$, and then that specialization occurs in the final year of the analysis $(x_{ri} - \hat{x}_{.i} > 0)$.

The allocation effect will take positive values in regions specializing in sectors where the growth rate is higher than the national growth rate, and vice versa. If the region's growth rate is lower than on the national scale, then the allocation effect takes negative values. In such a situation, it cannot be said that the region is the specialization of the studied phenomenon. (Table 1). The higher the value of the allocation effect for the entire region, the better the examined phenomenon is distributed between the analyzed ones. If there is no specialization in a given region, the allocation effect is zero, and the region does not benefit from competitive advantages [Suchecki, 2010].

In the analysis of the structure of animal production for all voivodeships, Poland was taken as the reference

Table 1. Characteristics of allocation effects

Specification	Sign a_{ri}	The sign of the components of the allocation effect	
		specialization	competitiveness
		$x_{ri} - \hat{x}_{ri}$	$tx_{ri} - tx_{.i}$
Specialization of the facility to the disadvantage of competitiveness	–	+	–
Lack of specialization of the facility to the disadvantage of competitiveness	+	–	–
Lack of specialization of the facility for the benefit of competitiveness	–	–	+
Specialization of the facility for the benefit of competitiveness	+	+	+

Source: [Suchecki 2010].

area, and the comparison was made in relation to the level of development of animal production throughout the country. The analyses considered the volume of livestock production in tonnes in individual voivodeships (r = 1, …, 16) in a structural breakdown by livestock species (i =1, …, 3; pork, beef and veal, and poultry, respectively).

RESULTS AND DISCUSSION

In the years 2010–2021, there were significant changes in the number of the most important livestock. The pig stock decreased by 27.6% to about 11 million heads, mainly as a result of the spread of ASF [Szymańska and Dziwulski, 2022] and the low profitability of production. The number of cattle increased by 11.5% to 6.4 million heads, with the number of cows decreasing by 9.7% to 2.4 million heads, and the number of other cattle increased by 29.6% to 4.0 million heads, which may indicate a greater interest of farmers in rearing beef cattle (Table 2).

In the years 2010–2021, the poultry stock increased by 33% to approximately 190 million units, while the number of chickens increased by 28.8% to 168.6 million units, turkeys by 107.1% to 15.3 million units, ducks by 97.3% to 5.3 million units, and the geese

Table 2. The population of selected species of animals for slaughter in Poland in 2010 and 2021

Specification	2010	2021	Changes 2021/2010 (%)
	Thousands of animals		
Pigs[a]	15,244	11,033	–27.6
Cattle[a], including:	5,742	6,401	11.5
• cows	2,646	2,389	–9.7
• other cattle	3,096	4,012	29.6
Poultry[b], including:	142,460	190,028	33.4
• chicken/poultry[c]	130,959	168,629	28.8
• geese	1,463	892	–39.0
• turkeys	7,366	15,256	107.1
• ducks	2,672	5,271	97.3

a. state in June; b as at the end of the year; c laying hens, chicken broilers.

Source: own study based on [GUS 2022c].

herd decreased by 39% to about 0.9 million units. The short production cycle in poultry livestock compared to pigs, and even more so with beef livestock, means that in the face of avian influenza, outbreaks of which have also been recorded in Poland in recent years, it is possible to rebuild its number relatively quickly, and thus the size of poultry meat production.

Due to changes in livestock stock in 2010–2021, the production of animals for slaughter in Poland increased by 34% (from 5205 to 6973 thousand tonnes), growing at a rate of 2.7% per year (Fig. 1).

This increase resulted primarily from the rapid increase in poultry production, the volume of which increased by almost 77% to 3,478,000 tonnes (the average annual increase in production amounted to 5.3%). Beef cattle production (including calves) increased by 39.2% to 1,080 thousand tonnes, which means it grew annually by 3.0%. In turn, the pro-

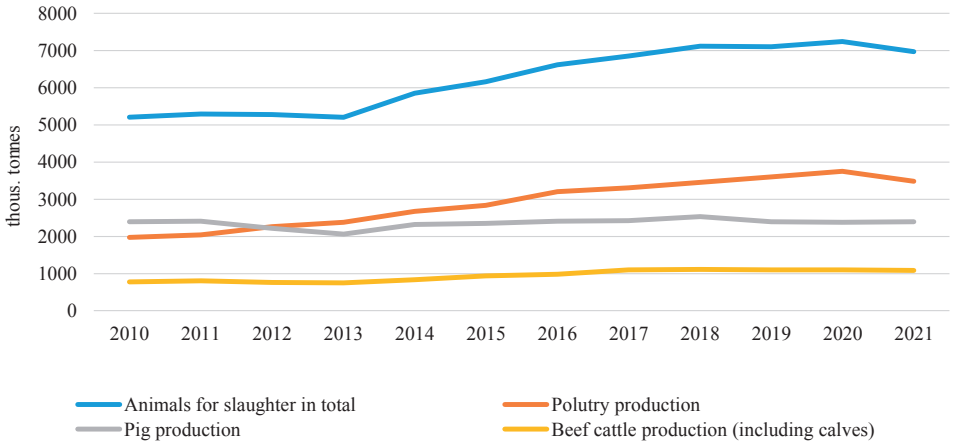

Figure 1. Production of animals for slaughter in Poland in 2010–2021 (in thousands of tonnes of live weight)
Source: own study based on [GUS 2011, 2015, 2022c].

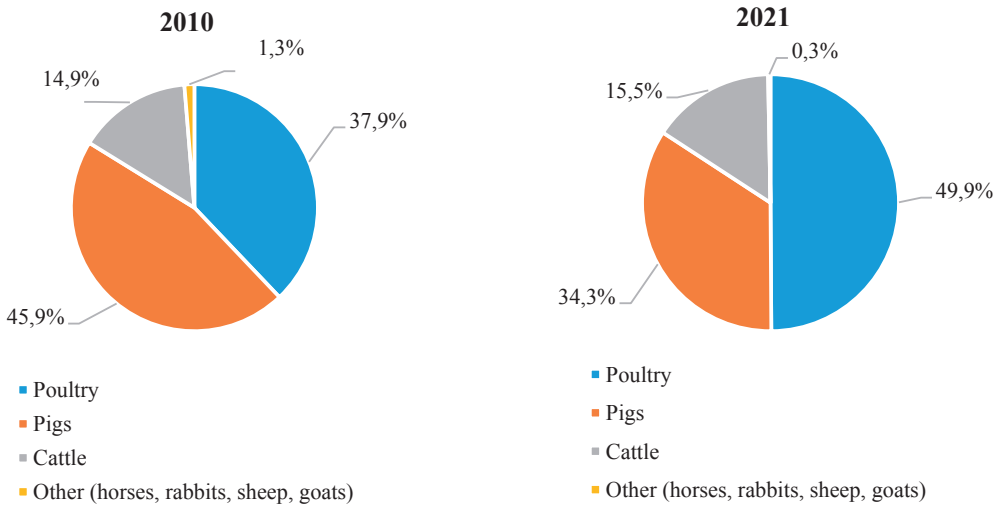

Fig. 2. The share of individual livestock species in the production of animals for slaughter in Poland
Source: own study based on [GUS 2022c].

duction of pigs for slaughter remained at a similar level of approx. 2,390 thousand tonnes. However, it was characterized by large fluctuations in the analyzed period. In the years 2010–2021, the share of live poultry production in total livestock increased to 49.9% (i.e., by 12.0 p.p.) and by 11.6 p.p. The percentage of pig production decreased to 34.3%. This was due to several factors, such as ASF, large fluctuations in purchase prices, lack of profitability of production, and liquidation of pig production, especially in small farms. In 2010, according to the data of the General Agricultural Census [GUS 2022a], there were 388.5 thousand farms in Poland engaged in pig farming, while in 2020, only 85.1 thousand. In turn, slightly, by 0.6 p.p., the share of live beef and veal increased to 15.5%, and by 1.0 p.p., other slaughtered animals, i.e., horses, rabbits, sheep, and goats, decreased to 0.3%. (Fig. 2). Poultry has become the leader in producing animals for slaughter in Poland, with approximately 60% of its production exported.

In the years 2010–2021, in the regional system (voivodeships), the production of animals for slaughter increased in eleven of them and decreased in five (i.e., in Dolnośląskie, Lubelskie, Małopolskie, Opolskie, and Podkarpackie), (Table 3).

The fastest increase in the production of animals for slaughter took place in the Mazowieckie voivodeship, where production grew by 8.1% annually and in 2021, it reached the level of about 1.7 million tonnes, and its "driving force" was primarily the rapid development of the production of poultry for slaughter. At the same time, the productivity of animals for slaughter in this voivodeship per 1 ha of UAA was the highest and amounted to 857.4 kg. The Wielkopolskie voivodeship

Table 3. Production of animals for slaughter in Poland in 2010 and 2021

Specification	2010			2021			Change 2021 2010 (% annually)
	Production (thousand tonnes in live weight)	Share (%)	Production of animals for slaughter (kg/1 ha of UAA)	Production (thousand tonnes in live weight)	Share (%)	Production of animals for slaughter (kg/1 ha of UAA)	
Poland	**5 205.4**	**100.0**	**335.8**	**6 972.6**	**100.0**	**466.3**	**2.7**
Voivodeship:							
Dolnośląskie	131.4	2.5	135.8	83.5	1.2	91.4	–4.0
Kujawsko-pomorskie	421.6	8.1	387.7	466.0	6.7	441.6	0.9
Lubelskie	314.2	6.0	221.8	268.1	3.8	193.7	–1.4
Lubuskie	138.9	2.7	308.0	166.2	2.4	374.4	1.6
Łódzkie	421.8	8.1	420.0	560.1	8.0	570.8	2.6
Małopolskie	179.4	3.5	270.5	118.0	1.7	211.6	–3.7
Mazowieckie	725.4	13.9	359.7	1.701.9	24.4	857.4	8.1
Opolskie	159.4	3.1	307.3	142.7	2.0	275.2	–1.0
Podkarpackie	119.8	2.3	172.8	57.9	0.8	101.1	–6.4
Podlaskie	292.2	5.6	273.0	390.5	5.6	355.0	2.7
Pomorskie	281.6	5.4	348.7	414.4	6.0	535.9	3.6
Śląskie	180.9	3.5	398.0	247.6	3.6	634.5	2.9
Świętokrzyskie	138.5	2.7	251.7	178.9	2.6	358.2	2.4
Warmińsko-Mazurskie	350.2	6.7	331.7	422.9	6.1	394.1	1.7
Wielkopolskie	1.129.6	21.7	631.1	1.388.3	19.9	781.3	1.9
Zachodniopomorskie	220.5	4.2	230.8	365.6	5.2	393.9	4.7

Source: own study based on [GUS 2011, 2022].

took second place, producing 1388 thousand tonnes of livestock (781.3 kg/1 ha of UAA). These two voivodeships accounted for 3,090,000 tonnes of animals for slaughter, which means over a 44% share in total animals for slaughter. Voivodeships with a significant share in animals for slaughter in Poland also include Łódzkie, Kujawsko-Pomorskie, Warmińsko-Mazurskie, Pomorskie, Podlaskie and Zachodniopomorskie voivodeship with production from 365.6 to 560.1 thousand tonnes of animals for slaughter.

Among the voivodeships, specialization in the production of animals for slaughter is progressing, resulting from many factors, including the size and structure of agricultural land. Pig production, which has declined for years, is dominated by the Wielkopolskie voivodeship, where 653.9 thousand tonnes were produced in 2021, accounting for 27.3% of the domestic output. Mazowieckie voivodeship (395,000 tonnes) came second place, followed by Łódzkie (295,000 tonnes), Pomorskie (268,000 tonnes), and Kujawsko-Pomorskie (222,000 tonnes). In these five voivodeships, pig production accounted for 76.5% of the national output.

In the analyzed period, in the voivodeships with the highest pig production, there was an increase in its production, with the fastest increase in production recorded in the Mazowieckie and Pomorskie voivodeships (the growth rate was 4.2 and 4.1% per year, respectively) (Table 4). In voivodeships with the lowest pig production, its reduction was observed, as exemplified by, among others: Dolnośląskie, Lubelskie, and Podkarpackie voivodeships.

The classic link between pig production, and even more so beef cattle production, with the appropriate utilized agricultural area (UAA) or permanent grassland as its fodder base, is currently losing its impor-

Table 4. Pig production in Poland in 2010 and 2021 (thousand tonnes)

Specification	2010	2021	Change 2021 2010 (% annually)
	thousand tonnes		
Poland	**2 388.2**	**2 395.3**	**0.0**
Voivodeship:			
Dolnośląskie	46.3	11.9	–11.6
Kujawsko-pomorskie	256.1	221.8	–1.3
Lubelskie	161.6	105.3	–3.8
Lubuskie	37.1	14.0	–8.5
Łódzkie	226.4	294.7	2.4
Małopolskie	69.0	25.0	–8.8
Mazowieckie	252.4	395.1	4.2
Opolskie	87.6	68.8	–2.2
Podkarpackie	50.8	25.8	–6.0
Podlaskie	97.4	75.7	–2.3
Pomorskie	172.4	267.9	4.1
Śląskie	58.2	33.8	–4.8
Świętokrzyskie	57.8	38.8	–3.6
Warmińsko-Mazurskie	113.3	131.6	1.4
Wielkopolskie	621.0	653.9	0.5
Zachodniopomorskie	80.8	31.2	–8.3

Source: own study based on [GUS 2011, 2022b].

Table 5. Beef cattle production (including calves) in Poland in 2010 and 2021 (in thousands of tonnes)

Specification	2010	2021	Change 2021/2010 (% annually)
	thousand tonnes		
Poland	**798.2**	**1 079.8**	**2.8**
Voivodeship:			
Dolnośląskie	17.7	11.9	–3.5
Kujawsko-pomorskie	46.9	73.2	4.1
Lubelskie	55.8	47.8	–1.4
Lubuskie	6.6	6.2	–0.6
Łódzkie	64.6	131.5	6.7
Małopolskie	60.1	53.1	–1.1
Mazowieckie	138.4	187.7	2.8
Opolskie	15.9	15.4	–0.3
Podkarpackie	19.1	11.0	–4.9
Podlaskie	107.5	119.4	1.0
Pomorskie	25.4	35.7	3.1
Śląskie	27.9	50.4	5.5
Świętokrzyskie	10.3	49.0	15.2
Warmińsko-Mazurskie	31.0	53.0	5.0
Wielkopolskie	138.6	222.3	4.4
Zachodniopomorskie	12.4	12.2	–0.1

Source: own study based on [Rocznik Statystyczny Rolnictwa, 2011; Rocznik Statystyczny Rolnictwa, 2022].

tance. In the pig fattening outlay system, it is enough for the agricultural producer to own (have) only the facility (pig house), and feed and piglets come from outside (from the operator). Similarly, poultry production, which is usually characterized by high intensity, has a loose connection with the land. In turn, the cattle grazing system can differ from extensive, based primarily on grassland, semi-intensive, and intensive.

In the years 2010-2021, beef cattle production in Poland increased in nine and decreased in seven voivodeships. Beef cattle production is dominated by four voivodeships, i.e., Wielkopolskie (222,000 tonnes), Mazowieckie (188,000 tonnes), Łódzkie (132,000 tonnes), and Podlaskie (119,000 tonnes) (Table 5), and the total share in beef cattle production in 2021 amounted to 61.2%.

Beef cattle breeding is developing the fastest in the Świętokrzyskie Voivodeship (at a rate of 15.2% per year) and in Łódzkie (6.7% per year). In these voivodeships, in the years 2010–2021, beef cattle production increased nearly five times (to 49.0 thousand tonnes) and more than two times (to 131.5 thousand tonnes), respectively. Poland is the largest producer of poultry meat in the European Union. The leader in domestic poultry production is the Mazowieckie voivodeship. In 2021, it accounted for almost 33.0% of production, i.e., 1,115.5 thousand tonnes, and the production growth rate in the period under review was the fastest in the country and amounted to 11.8%. Wielkopolskie voivodeship came second (511 thousand tonnes), followed by: Zachodniopomorskie, Warmińsko-Mazurskie, Podlaskie, and Kujawsko-Pomorskie voivodeship with production from 170.6 to 322.1 thousand tonnes (Table 6). In the analyzed period, poultry production decreased only in three voivodeships, i.e., Podkarpackie, Małopolskie, and Dolnośląskie.

Changes in animal production in individual voivodeships in 2010–2021 resulted mainly from

Table 6. Poultry production in Poland in 2010 and 2021 (thousand tonnes)

Specification	2010	2021	Change 2021/2010 (% annually)
	thousand tonnes		
Poland	**1 971.2**	**3 478.2**	**5.3**
Voivodeship:			
Dolnośląskie	65.3	59.4	–0.9
Kujawsko-pomorskie	117.1	170.6	3.5
Lubelskie	92.5	114.2	1.9
Lubuskie	94.8	146.1	4.0
Łódzkie	129.6	133.4	0.3
Małopolskie	43.9	38.6	–1.2
Mazowieckie	326.4	1 115.5	11.8
Opolskie	55.8	58.2	0.4
Podkarpackie	45.7	17.9	–8.2
Podlaskie	80.1	193.5	8.3
Pomorskie	83.3	110.3	2.6
Śląskie	91.2	158.6	5.2
Świętokrzyskie	46.0	90.6	6.4
Warmińsko-Mazurskie	205.3	238.2	1.4
Wielkopolskie	367.2	511.0	3.0
Zachodniopomorskie	127.0	322.1	8.8

Source: own study based on [Rocznik Statystyczny Rolnictwa 2011, 2022b].

changes in the profitability of production, requirements for animal welfare and environmental protection, and the occurrence of infectious diseases among farm animals. Live pig production is characterized by high fragmentation, increasing specialization in fattening, and high dependence on imported piglets from Denmark. A high level of vertical integration and large poultry meat exports to foreign markets distinguishes live poultry production. In turn, beef production most often complements milk production on farms and is characterized by high exports.

The next stage of the research aimed at determining the competitive advantages (gaps) in individual voivodeships in relation to the others in terms of the production of a particular livestock species. When analyzing the value of the second component of the allocation effect – competitiveness, the differentiation of voivodeships was demonstrated. In Figure 3, those voivodeships where the component "competitiveness" has negative values are marked in white. Positive values (black) characterize those voivodeships where there are competitive advantages in producing a given livestock species. In the case of pig production, the voivodeships located in the border area are characterized by competitive gaps. Only in the Pomorskie, Warmińsko-Mazurskie, Mazowieckie, Łódzkie, and Wielkopolskie voivodeships were the most significant increases in the volume of animal production recorded in the analyzed period.

In the case of poultry production, four voivodeships: Zachodniopomorskie, Podlaskie, Mazowieckie, and Świętokrzyskie, used their competitive advantages and increased the production volume more than twice. However, in the Mazowieckie voivodeship, poultry production increased by 200% between 2010 and 2021. The situation in the beef and veal market is more diversified. Half of the voivodeships in central Poland take advantage of their competitive position in the market and draw benefits from it. On the other

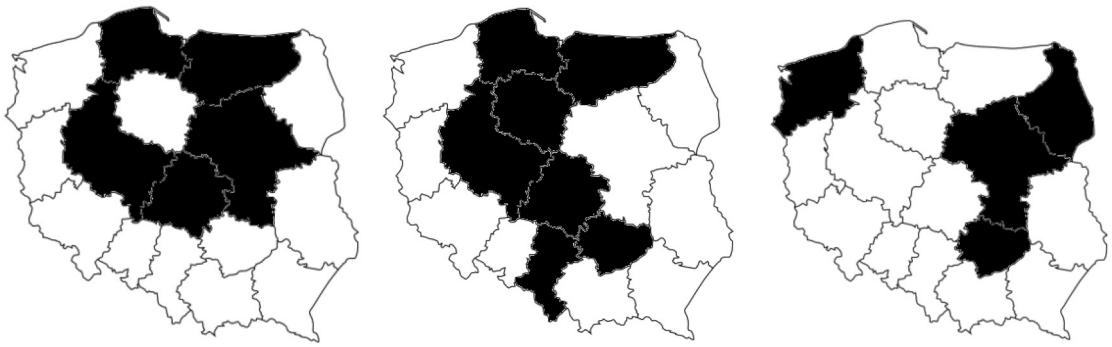

Fig.3. Element of the allocation effect "competitiveness" for production of animals
Source: own study.

hand, there are competitive gaps in the voivodeships from the border belt of eastern Poland and western Poland. However, a separate analysis of both components of the allocation effect does not provide complete information on the specialization and competitiveness of voivodeships in livestock production in Poland in the years 2010–2021. Considering both components of the allocation effect at the same time, there is a significant variation in the value of the allocation effect in all three analyzed species of livestock (Table 7).

In the conducted analysis, it is not possible to indicate voivodeships that would be characterized by a positive value of the allocation effect in terms of all livestock species. The voivodeships where the allocation effect is positive are those that specialize in producing a given livestock species and benefit from competitiveness. However, such a situation does not occur in the case of live poultry for the Łódzkie, Podkarpackie, Pomorskie, and Warmińsko-Mazurskie voivodeships. Regarding live pigs, the Podkarpackie and Pomorskie voivodeships are specialized, and there are no competitive gaps.

One of the ways to improve the effects of agricultural production is specialization and the use of competitiveness gaps. The increase in the specialization of production leads to an increase in its profitability and competitiveness [Dziwulski 2012, Tłuczak 2018], but it can also increase the management risk and threat to the environment [Józwiak and Juźwiak 2007]. The processes of concentration and specialization in animal production translate into the structure and inten-

Table 7. Allocation effect (a_{ir}) of animals for slaughter in Poland in 2010–2021

Voivodeship	Pig production	Beef cattle production	Poultry production
Dolnośląskie	–	+	+
Kujawsko-pomorskie	–	+	+
Lubelskie	–	–	+
Lubuskie	–	–	+
Łódzkie	–	+	–
Małopolskie	–	+	+
Mazowieckie	–	–	+
Opolskie	–	+	+
Podkarpackie	+	+	–
Podlaskie	–	–	+
Pomorskie	+	–	–
Śląskie	–	+	+
Świętokrzyskie	–	+	+
Warmińsko-mazurskie	–	+	–
Wielkopolskie	–	+	+
Zachodniopomorskie	–	–	+

Source: own study.

sity of plant production [Kopiński 2014]. Proper use of competitive advantages in the form of quality and price [Szczepaniak 2007, Ziętara 2014] will translate into an increase in the income of agricultural producers in the future [Sielska and Rembisz 2015].

SUMMARY AND CONCLUSIONS

Major changes are taking place in the structure of the livestock population in Poland. In the years 2010–2021, the pig stock decreased dramatically, mainly due to the presence of ASF, low profitability of production, and high price volatility. On the other hand, the stock of poultry, especially chicken, increased due to the increase in consumption and export of this animal species. Similarly, the stock of cattle, especially those intended for fattening, increased. In turn, the number of dairy cows decreased due to the abolition of milk quotas in 2015. Changes in the stock of farm animals contributed to the increase in production of animals for slaughter – from 5205 to 6973 thousand tonnes of live weight. In its structure, the share of poultry increased from 37.9% to 49.9% and of cattle from 14.9 to 15.5%. In turn, the share of pigs decreased by 11.7 p.p.

1. Specialization in the production of animals for slaughter is progressing among the voivodeships, which results, among others, from the size and structure of utilized agricultural areas. Five voivodeships play the most significant role in producing pigs: Wielkopolskie, Mazowieckie, Łódzkie Pomorskie, and Kujawsko-Pomorskie. In these five voivodeships, in 2021, pig production accounted for 76.5% of the national production. Beef cattle production is dominated by the Wielkopolskie, Mazowieckie, Łódzkie, and Podlaskie voivodeships. Together, in 2021, these voivodeships produced 61.2% of beef cattle. However, cattle breeding developed the fastest in Świętokrzyskie and Łódzkie voivodeships. On the other hand, the leader in domestic poultry production is the Mazowieckie voivodeship, followed by the Wielkopolskie, Zachodniopomorskie, Warmińsko-Mazurskie, Podlaskie, and Kujawsko-Pomorskie voivodeships.
2. A positive value of the allocation effect characterizes voivodeships that specialize in producing a given animal species. The production dynamics are higher in these voivodeships than the national ones. In the Dolnośląskie, Kujawsko-Pomorskie, Małopolskie, Opolskie, Śląskie, Świętokrzyskie, and Wielkopolskie voivodeships, due to the specialization of the production of beef cattle and poultry, the breeding of these animal species is concentrated. At the same time, both the specialization and concentration of production in these voivodeships translate into the use of competitive advantages by them. Thanks to this, agricultural producers can obtain higher income. Specialization and concentration of pig production were recorded in the Pomorskie and Podkarpackie voivodeships.
3. The data shows that in Poland, there is a specialization and concentration of animal production in individual voivodeships, which allows for the effective use of farm resources and greater competitiveness of regions. In voivodeships with higher specialization and concentration, the dynamics of live pig, beef or poultry production are higher than the national dynamics. However, accelerating production concentration may threaten agriculture's sustainable development and environmental protection. Therefore, further research on the impact of animal production on food security and the environment is recommended. A particular limitation in developing production concentration is the European Green Deal strategy implemented by the European Commission, which significantly emphasizes supporting organic farming and shortening supply chains in the agri-food sector. The search for alternative solutions in animal production is an important challenge for its development in Poland and the EU.

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WARUNKI ZMIAN W REGIONALNEJ SPECJALIZACJI PRODUKCJI ZWIERZĘCEJ W POLSCE

STRESZCZENIE

Cel: Celem opracowania było rozpoznanie regionalnej specjalizacji oraz zmian poziomu konkurencyjności w zakresie produkcji zwierzęcej w Polsce. **Metody:** Analizą objęto dane statystyczne Głównego Urzędu Statystycznego z lat 2010–2021 w skali kraju i w poszczególnych województwach. W badaniach zastosowano analizę porównawczą w zakresie produkcji zwierzęcej w ujęciu regionalnym. W celu określenia specjalizacji regionu oraz analizy zmian konkurencyjności w czasie zastosowano klasyczną metodę analizy przesunięć

udziałów – Shift Share Analysis (SSA). **Wyniki:** W Polsce zachodzą duże zmiany w pogłowiu zwierząt gospodarskich i produkcji żywca rzeźnego. W latach 2010–2021 drastycznie spadło pogłowie trzody chlewnej a zwiększyło się pogłowie bydła, zwłaszcza przeznaczonego do opasu oraz drobiu. Zmiany pogłowia zwierząt gospodarskich przyczyniły się do wzrostu produkcji żywca wołowego i drobiowego oraz spadku produkcji żywca wieprzowego. **Wnioski:** W Polsce występuje specjalizacja i coraz bardziej zwiększa się koncentracja produkcji najważniejszych gatunków zwierząt gospodarskich w poszczególnych województwach. Procesy specjalizacji i koncentracji pozwalają na efektywniejsze wykorzystanie zasobów gospodarstw rolnych i większą konkurencyjność regionów. Przyspieszająca koncentracja produkcji może jednak zagrozić zrównoważonemu rozwojowi rolnictwa i negatywnie wpływać na środowiska naturalne. Wskazane są zatem dalsze badania nad wpływem specjalizacji i koncentracji produkcji zwierzęcej na bezpieczeństwo żywnościowe oraz środowisko naturalne**.**

Słowa kluczowe: produkcja, region, koncentracja, trzoda chlewna, bydło mięsne, drób, konkurencyjność

CONTENTS
SPIS TREŚCI

INSTRUCTIONS TO AUTHORS

The journal *Acta Scientiarum Polonorum Oeconomia* features original scientific articles related to all aspects of economy, for example: food economy, European consumer goods market, sustainable regional development, development of culture environment, post crises political and social processes, human and social capital, labour market – gender perspective, public finances, rural development and entrepreneurship, social and innovative entrepreneurship, tourist economy.

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Chełkowski, Z. (1966). Introdukcja troci do rzeki Gowienicy. (Introduction of brown trout into the Gowienica river). Gosp. Ryb., 1(2), 18–19.

Greń, J., Kowalski, Z. (1972). Statystyka matematyczna. (Matematical statistics). PWN, Warszawa.

Pisulewski, P., Strzetelski, J., Antoniewicz, A. (2009). Podstawowe założenia IZ PIB-INRA norm żywienia przeżuwaczy (Basic objectives of nutritional standards for ruminants of the IZ PIB-INRA). [In:] J. Strzetelski (Ed.), IZ PIB-INRA. Normy żywienia przeżuwaczy. Wartość pokarmowa francuskich i krajowych pasz dla przeżuwaczy. Wyd. IZ PIB, Kraków, 11–20.

Patkowska, E., Konopiński, M. (2008a). Pathogenicity of selected soil-borne microorganisms for scorzonera seedlings (*Scorzonera hispanica* L.). Folia Horticul., 20(1), 31–42.

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Turski, W. (1972). Projektowanie oprogramowania systemów liczących. (Software design of computing systems). Mat. konf. Projektowanie maszyn i systemów cyfrowych. Warszawa 2–5 czerwca 1971. PWN, Warszawa, 132–139.

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