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COMPETITIVENESS OF POLISH DAIRY PRODUCTS IN THE OPINION OF MANAGERIAL PERSONNEL

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ABSTRACT

Aim: This paper aims to determine the competitiveness of Polish dairy products by surveying managerial personnel in dairy companies. The opinions of dairy plant managers on dairy product diversification constitute a valid research problem. **Methods:** The study was conducted in 100 dairy companies in Poland in 2021. An online questionnaire was initially designed for surveying all dairy plants in Poland (163). However, the survey proved to be problematic, and the study was ultimately carried out with the personal involvement of the research team. The results were processed and presented with the use of tabular, graphic, and descriptive methods. A logit model was used to check if the COVID-19 pandemic had an impact on competitiveness. **Results:** The respondents evaluated dairy products, variations in product prices, determinants of product success, product-related activities, and other factors. Dairy products received the highest scores for quality, demand, and brand on a scale of 1–5 points. Production, marketing, and reputation were regarded as the key determinants of market success. Factors decreasing the negative impact of COVID-19 in Polish dairy enterprises were: ease of shopping, use of transport companies, and competition in the sector. Managers also indicated product attributes that require improvement. According to them, the greatest improvements were needed in terms of innovation (53%), product range (52%), and observance of market trends (51%). **Conclusions:** The logit model found that the impact of COVID-19 was particularly decreased by the number of employed people, use of transport companies, ease of shopping, and competition in the sector.

Key words: milk, milk product, imports, exports, balance, dairy managers
JEL codes: F10, F13, F17

INTRODUCTION

Competitiveness is a broad concept that applies to dairy producers, dairy processing companies, and dairy products. The EU dairy market was regulated by CAP instruments which influenced the performance of milk and dairy producers, and processing companies.

Polish dairy products are cheaper than the products offered by European competitors, which increases the competitive advantage of Polish products on the European single market.

Poland is a big producer of milk. To be competitive on the European Union (EU) market the sector should deliver lot of cheap and good quality milk. The milk

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producer should be supported to achieve profitability of milk production. The average cow herd in Poland has 18 cows. There are not many big milk producers in Poland and most of the production is focused in small milk producers.

Competitiveness in relation to the enterprise is characterized by competitive advantage, competitive potential, competitive position, and competitive instruments. Competitiveness in relation to goods is described by characteristics that decide on market success in the market.

Products having success on the market achieve comparative advantage, which relates to the neoclassical theory of resource abundance, referred to as the Heckscher-Ohlin-Samuelson model [Pawlak and Lukasiewicz, 2022].

MATERIAL AND METHODS

The main aim of this study was to evaluate the competitiveness of Polish dairy products at the microeconomic level to:

- assess dairy product diversification relative to competition,
- evaluate the attributes of dairy products,
- evaluate product-related activities in the dairy sector,
- identify factors determining the success of dairy products on the market.

In this study, competitiveness was evaluated via the microeconomic approach, based on the results of a survey involving 100 dairy producers in Poland. An online survey could not be conducted, and all participants were interviewed by the researchers. The questionnaire was quite long, and consisted of 74 questions. The entrepreneurs did not want to answer them online because there were too many questions. Moreover, not all dairy enterprise executives were economists, and they did not possess knowledge about the economic issues mentioned in the questionnaire. Managers of dairy plants have degrees from agricultural universities such as the University of Warmia and Mazury in Olsztyn, Warsaw University of Life Sciences – SGGW, and the University of Life Sciences in Poznań.

Nonprobability sampling was used in the research process. A pilot was performed, and the authors received no complaints about the questionnaire. However, in spring of 2020, the COVID-19 restrictions started in Poland, and it had an obviously negative impact on the willingness to take part in the study. There are 163 dairy plants in Poland. First, the questionnaires were sent to all dairy enterprises. The motives to use nonprobability sampling were the purchase of milk, processing of milk and dairy products, and willingness to take part in the survey by entrepreneurs. Several company owners did not wish to participate in the study due to COVID-19 restrictions and personal data protection laws.

Map 1. Distribution of surveyed firms in Poland
Source: elaborations based on own survey.

The voivodeships of Wielkopolskie, Kujawsko-Pomorskie, Mazowieckie, Łódzkie, and Podlaskie have the largest number of dairy companies. Poland's leading dairy producers, including Mlekpol, Polmlek, Mlekovita, and SM Piątnica, operate in Podlaskie. In turn, Wielkopolskie has the largest number of dairy companies in Poland, but most of them are small and medium-sized enterprises.

Most dairy processing companies are small and medium-sized businesses employing 9 to 249 workers. The studied group also featured large companies employing more than 250 people. None of the analyzed companies employed fewer than 9 workers (Table 1).

The microeconomic analysis was based on a logit model. Logit regression models are based on a linear function. They are used to describe the impact of the set of explanatory variables on a qualitative variable. It is possible to assess the probability with which a specific variant of the dependent variable will occur in the future depending on the action of other factors (independent variables) [Lichota, 2020]. We chose the dependent and independent variables.

The "logit" model can be described as:

$$\ln [p / (1–p)] = \boldsymbol{a} + \boldsymbol{B}X + e \text{ or}$$
$$[p / (1–p)] = \exp (\boldsymbol{a} + \boldsymbol{B}X + e)$$

where:
ln – the natural logarithm, $\log_{exp}$,
p – the probability that the event Y occurs, p ($Y = 1$),
p/(1 – p) – the "odds ratio",
ln [p / (1 – p)] – the log odds ratio, or "logit",
all other components of the model are the same.

The dependent variable was Y_1 – pandemic negative effects. In the logit model, the dependent variable is discrete and takes values from a countable and finite set of values (categories) with a defined hierarchy [Gołaś and Kurzawa, 2014]. The dependent variable was marked as 1 when the COVID-19 pandemic had negative a impact and 0 when it did not have an impact (1–0) on dairy enterprises.

Then we asked the entrepreneurs which factors decreased the negative effect of the COVID-19 pandemic. We chose the following independent variables:
X_1 – number of employed people (number)
X_2 – use of transport companies (1–0)
X_3 – ease of shopping (1–0)
X_4 – improvement of supply chain management (1–0)
X_5 – high quality of products (1–0)
X_6 – entry barriers for other companies (1–0)
X_7 – power of the audience's influence (1–0)
X_8 – power of suppliers' influence (1–0)
X_9 – possibility of creating substitutes on the market (1–0)
X_{10} – competition in the sector (1–0)
X_{11} – low price (1–0)

RESULTS

The authors of the paper wanted to analyze the financial situation of dairy enterprises in Poland in 2005–2019. First, we analyzed the current liquidity. It describes the possibility of paying off current debts. As we can see from Figure 8, the current liquidity was at a stable level, however, the level was low. This means that the dairy enterprises' situation was good, particularly in 2016–2019, because the indicator was above 1.5 points.

Gross profitability, net profitability, and the accumulation of capital show similar changes. The biggest values were observed in 2007 and 2009. This means that the relation of income to revenues from sales was

Table 1. Characteristic of surveyed firms

Product diversification relative to the competition	Employment (number of workers)	Average number of employed	[%]
Small	up to 49	25	7
Medium-seized	50–249	134	56
Large	250 and more	1056	37

Source: own elaborations based on own research.

the highest. The lowest values of the analyzed variables were observed in 2018. This means that the situation was the worst in this year.

In the microeconomic approach, the competitiveness of Polish dairy products was analyzed by surveying 100 dairy companies (dairy cooperatives) in 2021. There were 163 dairy companies in Poland in 2021, which is a relatively large number. The large number of dairy cooperatives, milk producers and suppliers in Poland indicates that these companies are characterized by low economic power [WTO, 2017]. These businesses were surveyed to determine dairy product diversification relative to competition (Table 1). The largest number of respondents believed product diversification was moderate (50%) and high (32%). These results suggest that Polish dairy businesses compete by launching products with different attributes. In the studied group, 10% of the respondents argued that product diversification was very high.

Product diversification relative to the competition determines a company's ability to sell its products on domestic and foreign markets. The dairy sector has an estimated 7% share in agri-food exports and a 21% share in industrial exports [Gospodarowicz et al., 2013]. Companies diversify their products to increase sales. Product sales are influenced by economic, social, behavioral, and other factors. Producers should analyze consumer expectations and preferences and encourage consumers to select their products. Various marketing tools are used for this purpose [Mura, 2012].

The success of dairy products is also influenced by external factors, including prices on the global market, and improvements in milking conditions, milk storage and processing. The Polish dairy sector is well prepared for trade on the single market [Grębowiec, 2015].

The respondents were asked to evaluate the demand on the company's main market (Table 1). Most of the surveyed managers indicated that their companies had expanded their share of the market (56%) or that their market share had not changed (40%). These results point to moderate growth of the dairy sector.

The demand for dairy products is determined by consumer incomes. The sales of cheap dairy products, including milk, are higher in low-income regions. In these regions, the consumption of processed dairy products such as cheese tends to be lower.

The respondents were asked to evaluate the company's pricing policies relative to the competition (Table 2). In their opinions, the prices of dairy products did not differ between competitors (62%), which points to strong competition on the dairy market. Prices significantly influence the competitiveness of dairy producers. Nearly 35% of the respondents claimed that the price of their leading product was lower than the price quoted by their competitors. Prices fluctuate due to changes in market performance, and across seasons [Gospodarowicz et al., 2013]. The study demonstrated that dairy business managers monitor the market, compare prices, and keep prices at a low level because, product prices and consumer incomes are the main determinants of consumers' purchasing behavior. Price represents the buying power of money at the consumers' disposal. Polish consumers are highly sen-

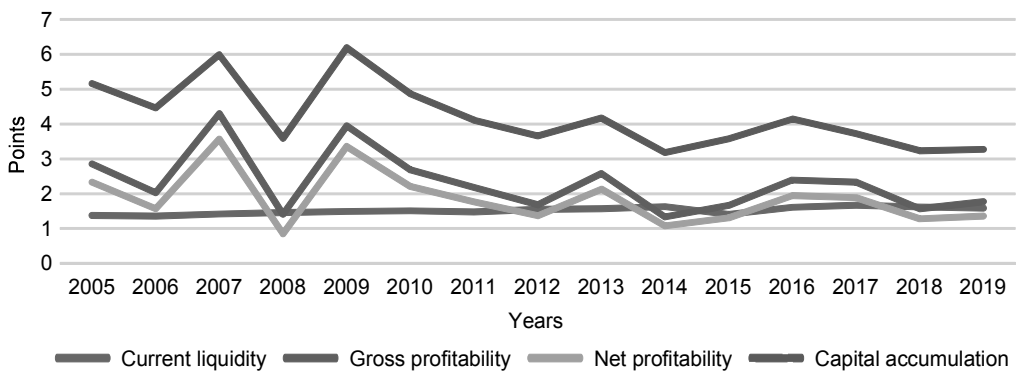

Fig. 1. Current liquidity, gross profitability, and capital in dairy farms in Poland
Source: own elaborations based on [Szajner, 2022].

Table 2. Product, demand, and price diversification relative to the competition (%)

Product diversification relative to the competition	**[%]**
Moderate diversification	50
High diversification	32
Very high diversification	10
Low diversification	7
Very low diversification	**1**
Demand for dairy products on the company's main market	
Growing market share	56
Stable market share	40
Declining market share	3
The relevant information is not available	1
Price of the leading product relative to the competition	
Similar to competition	62
Generally lower than competition	18
Generally higher than competition	16
The relevant information is not available	4

Source: own elaboration (n = 100).

sitive to changes in the prices of dairy products [Godlewska-Majkowska and Komor, 2021].

The respondents were asked to evaluate their products based on a provided list of attributes. The products were ranked on a scale of 1–5 points, where 5 denotes the most desirable result. The assessed products received the highest scores in terms of quality (3.72), demand (3.35), and brand (3.21). Quality received the highest scores, which implies that this parameter plays the most important role on the dairy market (Table 3). Dairy companies invest in new equipment to increase their output and processing capacity, improve product storage, and extend the shelf life of their products. The evaluated products received high scores for demand, which implies that consumers are strongly attached to specific brands. The managers also gave high scores to product brands. Dairy products can be sold under the label of retail chains or processing plants. Therefore, a brand expresses specific product attributes, prices, and other characteristics [Kowalska, 2020].

Table 3. Assessment of dairy product attributes on a scale of 1–5 points

Assessment of dairy product attributes	**Score on a scale of 1–5 points**
Quality	3.72
Demand	3.35
Price	3.16
Observance of market trends	3.12
Diversification	3.15
Brand	3.21
Packaging	3.03
Product range	3.01
Environmental impact	2.90

* Dairy products were evaluated on a scale of 1 to 5 points, where 1 is the least desirable and 5 is the most desirable score.
Source: own elaboration (n = 100).

The evaluated products received the lowest scores in terms of their environmental impact (2.90), product range (3.01), and packaging (3.03). Dairy plant managers should place greater emphasis on these attributes to improve the competitiveness of their products. The price of dairy products received one of the lowest scores (3.16). Dairy products are generally cheaper in Poland than in other EU countries, which testifies to their competitive advantage [Gospodarowicz et al., 2013].

The purchasing, storage, processing and production processes in Polish dairy plants improved after Poland had joined the EU. Polish dairy plants made significant investments to increase output and comply with EU standards.

The respondents were asked to identify factors determining a product's success. According to most of the surveyed managers, a product's success is determined mainly by the production process (71%), marketing (70%), and the company's reputation (50%). Dairy products are in the maturity stage of the life cycle and require marketing support (Table 4). Producers must reach consumers and influence their purchasing behavior. However, marketing activities are not always effective because consumers have devel-

oped resistance to conventional marketing strategies [Nieżurawski, 2006]. Marketing of processed foods probably constitutes the greatest challenge. Dairy plants purchase milk from farmers who do not participate in the production of processed foods that are sold on the retail market. The operations performed by milk farmers include milk production and storage, animal feeding, and monitoring animal health [Świątkowska and Krajewski, 2015].

Dairy company managers were asked to identify attributes that contribute to their products' success. According to most respondents, a product's success is determined mainly by high quality (75%), observance of market trends (40%), and innovation (32%). In the managers' opinion, a product's success is less dependent on durable packaging (12%), extensive product range (22%), or low price (24%). The following attributes were regarded as least important: purchases and supplies (16%), location and equipment (17%), and financial performance (20%). These factors are generally available, and they minimally affect a product's market success.

The respondents were asked to specify product-related activities in the company (Table 4). The largest number of managers pointed to activities aiming to improve product quality (54%), and changes in product packaging (47%). A relatively high percentage of the respondents indicated changes in product planning (22%) and branding (22%). These activities involve mainly product positioning to differentiate a company from its competitors. Online advertising and own transport were least frequently indicated. Modern dairy plants increasingly often must implement environmentally friendly solutions in production, storage, processing and packaging. These solutions, including eco-friendly packaging, are introduced to minimize dairy plants' environmental impact [Sirajuddin et al., 2016].

The COVID-19 pandemic also impacted the dairy enterprises. However, the structure of supply management in dairy enterprises recovered more quickly from the COVID-19 pandemic. This was because the disruption in supply did not affect the process of delivery. In a developed market, the process is automated, and milk is collected from farms directly by milk truck [Weersink et al., 2020].

Table 4. Factors determining a product's success on the market (%)

Factors determining a product's success on the market	[%]*
High quality	75
Production process	71
Marketing	70
Company's reputation	50
Market trends	40
Human resources	38
Innovation	32
Research and development	31
Low price	24
Broad product range	22
Financial performance	20
Location and equipment	17
Purchases and supplies	16
Durable packaging	12
Product-related activities in the company	
Improvements in product quality	54
Changes in packaging	47
Changes in product planning	22
Product branding	22
Accompanying services	18
Prolonged warranty	14
Other (please specify)	5
Extended warranty coverage	4
Changes in brand	2
Online advertising	1
Expanding product range	1
No changes	1
Closure of company that purchases and cools milk	1
Own transport	1

* The respondents could choose more than one answer.

Source: own elaboration (n = 100).

The respondents evaluated the effectiveness of product-related activities in the company (Table 5). In their opinion, changes in packaging (3.38), improvements in product quality (3.05), and changes in product planning (2.84) were the most effective activities. Dairy companies undertake these activities to improve the competitiveness of their products. Packaging is modified to increase product value, extend shelf life, and improve quality. Improvements in stock storage enable dairy companies to flexibly respond to changes in demand and consumer expectations [Baran and Żak, 2014].

The surveyed managers evaluated the importance of various product attributes. Good workmanship (4.41), friendly service (4.19), and effective complaint handling (4.12) received the highest scores. Product availability near the place of residence (1.85), client communication (3.09), and free transport (3.41) received the lowest scores.

The managers were asked to specify the stage of dairy products in the product life cycle (Table 6). Most of the respondents claimed that dairy products are in the maturity (64%) and growth stages (31%) of the life cycle. The smallest percentage of dairy plant managers were of the opinion that dairy products are in the decline (3%) and introduction stages (2%) of the life cycle. These data indicate that the Polish dairy market is not highly innovative. Polish dairy producers focus mainly on improving the nutritional value of their

Table 5. Effectiveness of product-related activities

Effectiveness of product-related activities	**Score on a scale of 1–5 points**
Changes in packaging	3.38
Improvements in product quality	3.05
Prolonged warranty	2.70
Changes in brand	2.15
Changes in product planning	2.84
Product branding	2.73
Other (please specify)	0.56
Importance of product attributes	**Score on a scale of 1–5 points**
Good workmanship	4.41
Friendly service	4.19
Effective complaint handling	4.12
Low price	3.86
Free transport	3.41
Client communication	3.09
Product availability near the place of residence or work	1.85

*Product-related activities were evaluated on a scale of 1 to 5 points, where 1 is the least desirable and 5 is the most desirable score.

Source: own elaboration (n = 100).

Table 6. Stages in the life cycle of dairy products

Stages in the life cycle of dairy products	**[%]**
Maturity	64
Growth	31
Decline	3
Introduction	2
Evaluation of the process of product/service development in the company	
Well planned and well implemented	49
Highly effective	33
The company does not have a product development system	13
A product development system exists, but has not been implemented	4
Badly planned and badly implemented	1
Product attributes that require improvement	
Innovation	53
Product range	52
Market trends	51
Packaging	48
Quality	47
Appearance	41
Other (please specify)	10
Eco-friendly packaging	3
Milk purchases	1
Shelf life	1

Source: own elaboration (n = 100).

products, introducing new flavors, improving product quality and packaging.

The respondents were asked to assess the process of product development in their companies. Most of the managers claimed that product development was well planned and implemented (49%) and highly effective (33%). Product development systems had not been implemented in 13% of the surveyed companies.

The respondents were also asked to indicate the product attributes that require improvement. According to the surveyed managers, the greatest improvements were needed in terms of innovation (53%), product range (52%), and observance of market trends (51%). These attributes exert the greatest influence on consumers' purchasing behavior, and they should be improved to comply with market trends and consumer preferences. In addition to traditional products, dairy companies should introduce innovative products to their offer. Eco-friendly packaging (3%), milk purchases (1%), and shelf life (1%) were regarded as the attributes that require the least improvement.

Finally, we conducted the logit model to measure which variables decreased the negative effect of the COVID-19 pandemic. According to the entrepreneurs, there were many factors which decreased the negative impact of COVID-19. Our analysis proved that the impact of COVID-19 was particularly decreased by: X_1 – number of employed people, X_2 – use of transport companies, X_3 – ease of shopping, and X_{10} – competition in the sector (Table 7). Such results can be explained by the activities undertaken by the entrepreneurs. They did not want to neglect their companies and actively mitigated the negative impact of COVID-19. The negative impact was particularly seen in winter, whereas

Table 7. Logit model evaluations of factors decreasing the negative effects of COVID-19 in Polish dairy enterprises

Variables	coefficient	Std error	z	Final effect
Const	–3.55	2.58	–1.38	–
X_1 – number of employed people (number)	0.00	0.00	1.53	0.02
X_2 – use of transport companies (1–0)	0.24	0.74	0.33	0.02
X_3 – ease of shopping (1–0)	0.59	0.38	1.55	0.05
X_4 – improvement of supply chain management (1–0)	–0.38	0.34	–1.13	–0.04
X_5 – high quality of products (1–0)	0.10	0.34	0.28	0.01
X_6 – entry barriers for other companies (1–0)	0.38	0.35	1.08	0.04
X_7 – power of the audience's influence (1–0)	0.29	0.43	0.67	0.03
X_8 – power of suppliers' influence (1–0)	0.12	0.39	0.30	0.01
X_9 – possibility of creating substitutes on the market (1–0)	–0.44	0.45	–0.99	–0.04
X_{10} – competition in the sector (1–0)	0.29	0.35	0.84	0.03
X_{11} – low price (1–0)	–0.07	0.30	–0.23	–0.00
Arithmetic means of the dependent variable	0.747	SD of dependent change		0.436
Sum of squares of residuals	30.179	SDE of residuals		128,149.3
R^2 determination coefficient	0.179	Corrected R^2		–0.044
χ^2	19.31	The p-value for the F-test		0.000
Likelihood logarithm	–44.04	Critical Information Akaike criterion		112.08
Critical Bayesian Schwarz criterion	142,728	Critical Hannan-Quinn criterion		124.46

Source: elaborations based on own research (n = 100).

in summer and, spring when the milk production is bigger, the companies strove to fulfill the increasing demand for dairy products. The number of people employed also had a positive impact on decreasing the effect of COVID-19. This means that companies employing more people are more stable in difficult times. One employee can perform another job in the enterprise during a pandemic. Other variables decreasing the negative effect of the COVID-19 pandemic were: X_8 – power of suppliers' influence, X_7 – power of the audience's influence, and X_5 – high quality of products. This means that traditional factors deciding competitiveness also have an impact on decreasing the negative impact of the COVID-19 pandemic. In this way, we can conclude that taking about the competitiveness of dairy enterprises also helps in overcoming such a barrier as the negative impact of the COVID-19 pandemic. The R^2 determination coefficient was 0.179 and the p-value for the F-test was 0.001.

CONCLUSIONS AND IMPLICATIONS FOR POLICY

According to the surveyed managers, their dairy products should receive the highest scores for quality, demand, and brand. Therefore, these attributes largely determine consumers' purchasing behavior. These results also indicate that consumers pay attention to dairy brands. The respondents also argued that price is an important attribute of dairy products. In their opinion, the prices of their products were similar or lower than those quoted by the competition. The Polish dairy market is highly saturated, and price and quality competition between companies is fierce.

The competitiveness of Polish dairy products at the microeconomic level was determined by surveying the managers of dairy plants. According to the respondents, dairy products were characterized by moderate and high diversification. The surveyed managers identified various product-related activities that are undertaken to improve product quality, modify product packaging, improve product planning and branding. Dairy products are sold under the label of dairy plants or retail chains. The respondents also evaluated the effectiveness of product-related activities. In their opinion, packaging modifications, improvements in product quality, and changes in product planning were the most effective product-related activities. The surveyed managers also argued that the success of dairy products is determined mainly by high quality, observance of market trends, and innovation.

The policy and industry implications of these empirical results are crucial. The industry of the dairy sector should be more focused on market orientation. Marketing tools such as products, price, promotion, and distribution and logistics are the most important. The first aim is to identify and recognize consumers' wishes, and then prepare such products. Moreover, dairy products belong to the category of basic products and are an important part of the human diet, so consumers are vulnerable to price changes.

There are also suggestions for further research and limitations of the study. Research involving entrepreneurs is some of the most difficult to implement. The owners of enterprises are very busy and have limited time to take part in studies. New and more advance methods such as phone conversations and others should be used. Such research is also very expensive and more Internet-based options, such as Internet questionnaires, can be included in future research.

Our initial analysis using a logit model proves that there are many factors decreasing the negative effect of the COVID-19 pandemic, among which, the most important are: X_1 – number of employed people, X_2 – use of transport companies, X_3 – ease of shopping, and X_{10} – competition in the sector. Such results demonstrate the strength of the competitiveness of enterprises based on competitive advantage, position.

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KONKURENCYJNOŚĆ POLSKICH PRODUKTÓW MLECZARSKICH W OPINII PERSONELU ZARZĄDZAJĄCEGO

STRESZCZENIE

Celem niniejszego artykułu jest ponanie konkurencyjności polskich produktów mleczarskich poprzez badanie kadry kierowniczej w firmach mleczarskich. Opinie kierowników zakładów mleczarskich na temat dywersyfikacji produktów mleczarskich stanowią ważny problem badawczy. Badanie przeprowadzono w 100 firmach mleczarskich w Polsce w 2021 r. Ankieta internetowa została pierwotnie zaprojektowana do badania wszystkich zakładów mleczarskich w Polsce (163). Ankieta okazała się jednak problematyczna i ostatecznie badanie zostało przeprowadzone przy osobistym zaangażowaniu zespołu badawczego. Wyniki zostały przetworzone i zaprezentowane metodami tabelarycznymi, graficznymi i opisowymi. Aby sprawdzić, czy pandemia COVID-19 miała wpływ na konkurencyjność, wykorzystaliśmy model logitowy. Respondenci oceniali produkty mleczne, wahania cen produktów, determinanty sukcesu produktu, działania związane z produktem i inne czynniki. Produkty mleczne otrzymały najwyższe oceny za jakość, popyt i markę w skali 1-5 punktów. Produkcja, marketing i reputacja zostały uznane za kluczowe wyznaczniki sukcesu rynkowego. Chcieliśmy rozpoznać, które czynniki zmniejszają negatywny wpływ COVID-19 na polskie przedsiębiorstwa mleczarskie. Stwierdziliśmy, że była to łatwość zakupów, korzystanie z firm transportowych i konkurencja w sektorze.

Słowa kluczowe: mleko, produkty mleczne, eksport, import, saldo, personel zarządzający.