

## Article

# Implementation of Food Retail Functions in Poland in the SARS-CoV-2 Pandemic

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**Abstract:** Retail trade is one of many links of the food supply chain to the consumer. Therefore, the efficiency of its operation is influenced by the earlier located links in the chain, first of all by agriculture, processing, logistics, and wholesale trade, as well as by consumers. The research problem in this paper, specified in the form of questions, is as follows: Has the 2020 pandemic reduced the performance of food retailing functions in less-developed regions of Poland? What is the assessment of the degree of their implementation? What directions should be taken at the micro and macro level to increase resilience to the negative effects of future crisis phenomena, in the implementation of the functions of this trade? The cognitive aim of the study was to examine the degree of performance of economic and social functions by the food retail trade in Poland, after one year of the SARS-CoV-2 pandemic (with the example of the Lubuskie region). For its implementation, four research hypotheses were formulated. The work was carried out in three stages, theoretical-interpretative, methodological, empirical, and consisted of three parts. In the experimental part, the method of CATI interviews with store owners/managers and the method of advanced statistics, classification, and visualization were used. The article brings new cognitive and normative value concerning food retailing in Poland. The results of the study enabled the realization of the aim of the paper and the verification of the hypotheses. The conclusions are presented in the summary of the individual parts of the empirical data analysis and in the conclusion of the paper. The paper contributes to the literature a new recognition of the degree of performance of the seven examined functions by food retail units, during the pandemic.

**Keywords:** economics of moderation; ecological economics; sustainable supply chain; sustainable consumption; food self-sufficiency; food retail functions



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## 1. Introduction

Since the second half of the Twentieth Century, among the representatives of science, there has been a change in the orientation of economic thought from neoclassical, associated with neoliberal thinking about the processes of management, towards a new paradigm, on which the concept of sustainable development is based. The new approach to this problem, in relation to economies with different levels of development, was represented primarily by the current of ecological economics [1–5] and institutional economics [6–8].

Taking into account the recommendations arising from these theories was supposed to lead to an increase in the degree of economic convergence between less developed and highly developed countries, such as in the EU, and to a reduction in the previously growing wealth and income polarization of the world population [9]. This beneficial de facto phenomenon has occurred in Europe, as evidenced by the reduction in the Gini coefficient, which was 35.6 points in 2005 and fell to 30.2 points in 2019 [10]. The situation has worsened under the impact of pandemics [11–14]. The number of people in the world experiencing hunger increased in 2020 in the shadow of the COVID-19 pandemic. After

remaining virtually unchanged from 2014 to 2019, the incidence of malnutrition increased to about 9.9% in 2020, up from 8.4% the year before [15]. This was confirmed by the UN World Food Programme, which estimated that the number of people experiencing acute food insecurity increased by several million over the past year (April 2020–April 2021) in the 35 countries where it operates [16]. In contrast, based on worldwide data, the UN released a report in July 2021 showing that 10% of the world's population is undernourished, with more than 820 million people currently suffering from hunger. This level increased during the pandemic period as 2.3 billion people, i.e., 30% of the world population, had limited access to food. This is a very serious breach of global food security.

Questions arise: In view of this, will the existing pressure of the negative economic impact of the SARS-CoV-2 pandemic on the world have the effect of stopping, reversing, or increasing the process of egalitarianism? Will the deterioration of the income situation of many social groups cause food insecurity for the population in terms of physical and economic availability? How can this be counteracted?

In response to these questions, an emerging view from the literature is that when countries are weighed by population, international inequality increased during the pandemic period [17–19]. In addition, it has been documented that in the EU and some other developed and emerging countries, workers with low levels of education suffered much more than others in terms of job losses due to the 2020 pandemic [20]. As a result, the pandemic increased income inequality between rich and poor individuals [20], reducing per capita income more in poor countries than in rich ones. Food price increases of several to tens of percent in, for example, maize, fruits, and vegetables also had an impact. In retail trade, the reasons for the rise in price cost inflation lay in international supply chains that were disrupted, interrupted, altered, or delayed [21].

The topic is therefore very important and timely, because it concerns the most important existential needs of humans, the satisfaction of which has been threatened as a result of the SARS-CoV-2 pandemic. Meanwhile, there is no regional research on the importance of food retailing in reducing this threat. Yet, retail trade is one of many links in the food supply chain to the consumer, as the end user. Entities of this trade perform many coexisting functions of internal character on the micro level and external to the environment. The efficiency of their realization is influenced by the previously located links in the chain, i.e., the producer of raw materials, processing, logistics, wholesale trade, and others. However, during a pandemic, consumers have a particularly important influence on the behavior of food retailing. These determinants of influence on the functioning of food retailing make it belong to this sphere of economic activity, which is particularly sensitive to the risk of pandemic effects [22].

In this context, it becomes important to delineate courses of action to reduce the negative effects of the existing pandemic on the realization of retail functions (micro level) and to strengthen economic and institutional systems against its negative consequences in the future (macro level).

Let us note that the number of countries that are fully self-sufficient in the production of staple foods and supplying the internal market with domestic food items in relation to needs is small [23]. Poland belongs to the safe countries in this respect [24,25]. It is an exporter of food. The degree of food self-sufficiency in this case means the percentage ratio of domestic production to domestic consumption with imports and exports included. Nevertheless, it should be remembered that the conditions favoring the development of agriculture and other nonagricultural food industries in many countries may change in a short period of time, under the influence of climatic shocks, limitations of the resources possessed as to their quantity and quality, disturbances in international trade as a result of the increase of nontariff barriers, or as a result of world disorder (conflicts, military and political actions, etc.). The importance of food trade and its contribution to food security imposes an obligation on all countries to introduce systems for the adequate protection of human, animal, and plant health while facilitating trade [26]. An important role in this regard, for the stabilization of food security of nation states, is played by the interventionist

policy of governments [27]. We consider correct the view that the pandemic has changed the relationship between the market and the state, in favor of the growth of its policy in the allocation and distribution processes, probably long-term, which will affect international cooperation [28].

International markets have not experienced deeper perturbations to date [29–33], but their sustainable resilience cannot be assumed if the pandemic persists and lockdown returns, especially given the weakness of existing international organizations in quality activities (products, institutions, environment) under the sustainable development paradigm [34,35]. Therefore, the performance of this work brings a new cognitive and normative value for the food sector of Poland. The conclusions of this research can be useful (dedicated) also for other countries, especially those with negative and unstable food balances.

## 2. Materials and Methods

### 2.1. Research Problem, Objectives, and Hypotheses

Previous research [36,37] indicated that, as a result of the pandemic, there have been many disruptions to the food market in Europe and the world. We know that the threats on the demand side have increased [38] due to, among others, restrictions on population movement and the closure of many food service companies [39] and reduced labor force participation and the decreased income of the population [40]. These phenomena in Poland affected, to different degrees, individual food industries in terms of quantitative and structural changes in demand and supply, e.g., a decrease in demand in the baking industry and its increase in the fruit and vegetable and milling industries [41]. At the same time, demand for processed domestic products with a longer shelf-life increased. On the supply side, in turn, there were export restrictions in many countries. This was caused by restrictions on production activities and difficulties in market access or port closures, cancellation of airplane flights or delays in logistics and distribution, or increases in sea and air freight prices [41].

At the micro level, the formative effects of these phenomena are reflected in food retail stores and may be regionally differentiated, but there is a lack of validated knowledge as to their magnitude and directions of change. We do not know what decisions food retail store managers make during a pandemic in performing their functions. How do they differentiate these functions by importance during this time? In view of this, the research problem, in the context of economic and social functions, boils down to the following questions. The research problem in this paper, specified in the form of questions, is as follows: Has the 2021 pandemic reduced the performance of food retailing functions in less-developed regions of Poland? What is the assessment of the degree of their implementation? What directions should be taken at the micro and macro level to increase resilience to the negative effects of future crisis phenomena, in the implementation of the functions of this trade? The cognitive aim of the study was to examine the degree of performance of economic and social functions of food retailing in Poland, during the SARS-CoV-2 pandemic (with the example of the Lubuskie region). The normative aim was to identify the main factors of the increase in the efficiency of food retailing functions in a crisis situation. For their better implementation, four research hypotheses were formulated:

**Hypotheses 1 (H1).** *The negative phenomena of the 2020/21 pandemic that occurred in food retailing in Poland did not have a reductive effect on the performance of its economic and social functions.*

**Hypotheses 2 (H2).** *The degree to which food retail stores perform social and economic functions depends on their type.*

**Hypotheses 3 (H3).** *External factors were the primary barriers to the performance of functions by food retailing.*

**Hypotheses 4 (H4).** *The fulfillment of the internal logistics function of food retailing depends primarily on the internal factors of the units, determining the efficiency of supply chains.*

## 2.2. Scope of Work and Phases of Its Execution

The subject scope of the study included 20 food retail units. The study was performed after more than one year of the pandemic (April 2021). The territorial scope of the work included entities located in Lubuskie Province. This region is classified as less developed than the national average in Poland, in terms of industrialization, urbanization, investment attractiveness, labor market, and GDP/pc [42]. In justifying such an area of study, however, it is important to keep in mind that Lubuskie has a greater vulnerability to the risk of negative pandemic effects due to its lower income and weaker household financial condition. Moreover, it is the regional market that is the primary source of information for business entities and individuals. Thus, knowledge about it is an important condition for production actors to make decisions in meeting consumer demand, i.e., the size and current and ex ante preferences of consumers. Thus, let us note that the characteristic feature of the food market of Lubuskie are [43,44]:

- Very favorable geopolitical location from the point of view of trade. It borders with Germany, which provides access to an attractive market for food products and supply imports in Western European countries;
- Membership of the Pro Europa Viadrina Euroregion and the Spree-Nysa-Bohr Euroregion, which provides good conditions for interregional trade cooperation;
- Developed regional communication network, road and railroad, as well as water transport (14 border crossings), which reduces the logistics and distribution risk of food products;
- The high share of the voivodeship's agriculture in the creation of a GDP of 3.5% in 2019, (with the national average of 2.1%) provides raw materials for processing and finished products for the food market;
- Natural conditions (nonindustrialized area) create opportunities for the development of the regional organic food market and Lubuskie's 8th place in the country in 2020 in terms of the number of organic producers [45] (p. 23).

The presented work was carried out in three stages. In the first, an in-depth literature review was performed to determine the assumptions on which the research problem was based, and the state of existing ignorance, the so-called cognitive gap determined, and the research hypotheses formulated. This part of the study was interpretive in nature. The second phase of the so-called conceptual phase included deciding on methods, conducting the selection of the sample population, creating an interview form containing 38 questions as a cognitive instrument, and performing the empirical study in 2021 based on the structured questionnaire of questions. In turn, the third phase of the work included the statistical analysis of the data from the empirical study, the presentation and description of the results and their discussion, and the conclusion.

## 2.3. Interpretation of the Basic Economic Categories Used in This Paper

In economic sciences, there are often concepts that are ambiguously understood. Below, we explain the definitions of the main concepts interpreted in this work, i.e., economic and social functions of firms, food self-sufficiency, and sustainable food supply chain.

Firms perform many important functions related to the economic process and social development. They are related to their goals and tasks defined in the statutes and in the long-term plan of functioning. It is difficult to make a gradation of their importance, because at the basis of all functions lies the social responsibility of the company towards customers (recipients) and the natural environment and the subjective (competitive) environment, as well as towards the employed staff, i.e., their safety and development. The functions related to these goals are of paramount character in the cascade of multiple goals of each organization [46].

Based on brainstorming upon insights from the selected literature on the food market and retail and their social and economic dimensions, among others [47–51], the authors selected the following main functions of food retailers:

- F1—Food security, which is realized by securing the constant access of consumers in place and time to the quantity and value of food products (social function);
- F2—To satisfy the preferences of buyers by adjusting the structure of the food offered (social function);
- F3—Disciplining the increase of the selling prices of goods due to the prevention of the decrease in purchasing power of the population (social function);
- F4—Ensuring the supply of food products to consumers (logistic, distribution, and control function);
- F5—The development of its own production potential, its modernization, and restructuring for a competitive increase of the company's value and its position in the market (economic and development function);
- F6—Securing jobs for employees, through various flexible working time solutions, in the field of selling food to consumers (social function);
- F7—Using promotion for cognitive purposes and building a new consumer culture (information and education function).

All of the functions listed directly or indirectly (F4, F7) are economic and social in nature. They are of primary importance, related to food security [52]. The last function (F7) can be considered as an additional one, although during a pandemic, its importance rises to a key one. The literature lacks quantitative measures of organizational functions that allow direct measurement, so a measure of subjective assessment made by store managers was used.

Food self-sufficiency is another concept that needs to be addressed as to how it is understood at work. The Food Agriculture Organization defines self-sufficiency in broad terms: “The concept of food self-sufficiency is generally taken to mean the extent to which a country can satisfy its food needs from its own domestic production” [53,54]. Unfortunately, this definition does not cover some aspects, e.g., whether a self-sufficient country engaged in international food trade with other countries. According to J. Clapp [55], “...Determining how trade fits into the food self-sufficiency policies of individual countries requires further refinement of the definition of the concept and clarification with respect to how it guides government policy choice”. In a broader view, which the authors identified with in this work, the food self-sufficiency of a country is understood as the ability of the entire economy—that is, both agriculture, food industry, and other sectors in the country (including trade)—to meet the national demand for food [56]. Some authors define self-sufficiency from the point of view of the amount of kcal supplied [57]. For example, A. Sadowski and A. Baer-Nawrocka [58] developed such an “energy” index for EU countries covering the period 1990–2009.

The next economic category to be explained is the sustainable food supply chain. During a pandemic, among the factors in choosing food supply chains that determine their length and sustainability, a better degree of meeting consumer needs for quality, the flexibility of supply, and product safety become crucial. Bearing less food waste and less environmental burden is also a very important factor. Short supply chains, within a national economy or EU area, can be expected to better fulfill these functions [58–61] and are more sustainable, especially in the situation of the full self-sufficiency of Poland in many basic agricultural products [62]. By a sustainable food supply chain, the authors mean one that ensures the reduction of food losses and disparities in the share of the value added of the actors of individual links in the chain. This is an important aspect of the actors' interaction, in the context of the imbalance of bargaining power between the existing high degree of production concentration and the fragmented structure of food retailing. It is also worth quoting the FAO's more complete definition “...a sustainable food value chain (SFVC) is a food value chain that: is profitable at all its stages (economic sustainability), provides broad benefits to society (social sustainability) and has a positive or neutral impact on the environment (environmental sustainability). The SFVC concept recognizes that value chains are dynamic, market-based systems in which vertical coordination (gover-



nance) is a central dimension and for which value-added and sustainability are explicit, multidimensional measures of performance, assessed at the aggregate level” [63].

#### 2.4. Research Methods Used

In the presented study, the method of study and literature and other secondary sources, as well as the method of induction, statistical analysis, interview, comparison, and description, were as follows. This empirical study was a pilot, nonrepresentative, performed in April 2021. Computer-Assisted Telephone Interviewing (CATI) was conducted for this purpose. Respondents were store owners or managers. A nonrandom, purposive sampling method was used to select units among small- and medium-sized food retail businesses in Lubuskie. The interview form was structured and contained, in addition to a metric, 37 closed-ended questions and 1 open-ended question, situated in 4 separate sections, regarding the impact of COVID-19 on the implementation of the economic and social functions of the store. Some questions were expanded with several response options. In the metric, respondents specified the specialization of the store, among 5 possibilities, and its type related to the size of the area, e.g., supermarket, discount store, grocery store, or specialty store (bakery, meat). Additionally, the respondents were asked about membership in a merchant organization, to which only four interviewees responded positively.

Among the substantive questions (denoted P), the first group of 11 concerned the food retailing functions F1 through F3 performed as part of the food turnover (Part 1 of the interview form). The second group of questions referred to functions F5, F6, and F7, which resulted from the involvement of tangible and intangible and organizational capital in the surveyed retail unit (17 questions in total). In the third group of six questions (29–32 and 35a–b), the respondents evaluated the supply chains and suppliers of food products, which is part of function F4 of the food retail store. The last question constituting Part 4 of the interview questionnaire addressed the extent to which the store performed each of the seven functions listed in the questionnaire on a five-point Likert scale from 1 (low rating) to 5 (high rating).

The entire study was quantitative and qualitative in nature. Answers were sought to explain the evaluation of the degree of execution of the stores’ functions: which factors influenced the execution of the functions, which functions were the most important, if the type of the store (TYP, SPEC) impacted the role of the functions in the eyes of the managers, what was the degree of functions’ execution and what were the barriers to their execution, etc. The method of advanced statistics (principal component analysis, agglomeration) and visualization was used in the data processing. For years, Principal Component Analysis (PCA) has been applied in various sciences to extract the dominant patterns in a data matrix in terms of a complementary set of scores (in our case, characterizing the respondents) and loadings (in our case, for the questions) [64,65]. In this paper, three standardized data matrices were used:

- On the turnover of the stores under study (Variables 1–11);
- On the performance of economic functions (Variables 12–28);
- On the performance of supply and procurement chains (Variables 29–35c).

We performed PCA with varimax normalized rotation in the Statistica 13 program. Three components contributing to total data variability in 60–70% were selected for further analysis and exploration. In the cluster analysis, we applied the standardized data matrix used in PCA. Ward’s nearest neighbor chain algorithm was used based on the Euclidean distance in a multidimensional space. The smaller the distance of a pairing, the stronger the similarity of the paired items is. A tree diagram was also made for seven questions about the degree to which the commercial units under study performed the functions.

The study was conducted under the auspices of the Polish Economic Society—Independent Branch in Zielona Góra. Limiting the scale of the study to 20 entities resulted from the difficulty of obtaining reliable information from a larger number of respondents at no cost. However, the analysis of the data from these units and the results obtained were sufficient to carry out the aim set for this paper and to verify the adopted hypotheses.

### 3. Results and Discussion

#### 3.1. Literature Review

On the basis of an in-depth literature review, the knowledge about the research subject and the research gap regarding the functions of retailing in general, with particular reference to food retailing, were identified. During a pandemic, economic and social functions are of particular importance. Therefore, decisions were made: firstly, to identify these functions regarding food retail and analyze the degree to which they were being realized during the SARS-CoV-2 pandemic and, secondly, to examine the underlying factors of the aforementioned functions and the need to strengthen these factors, to maintain the efficiency of food retailing in future crisis situations. Based on the literature on the subject and the applied brainstorming method among the authors of this article, as internal experts, seven economic and social functions of food retailing were derived.

We found that there were no relevant studies at the micro level on the regional system of Poland, which would allow the generalization of the results to the macro level. However, the effects of the pandemic reflected in the performance of food retail may be regionally heterogeneous. In interpreting the existing state of knowledge, it was decided to fill the research gap by conducting empirical research in the Lubuskie Voivodship, as an example of an underdeveloped region in Poland. The reason for such a territorial scope of the research was the assumption that due to the fact, documented in the literature, that the income polarization of the world's society deepened during the pandemic crisis and the pauperization of the population increased, research in an economically underdeveloped region would best reflect the situation considering the posed research problem.

#### 3.2. Empirical Results

##### 3.2.1. Social Function Realization

The first part of the interview form addressed the issue of social functions (F1, F2, F3) in retailing during the pandemic. Figure 1 shows the dendrogram of the variables' relationships in the 11-dimensional space. The closest variables were P5 and P7, which indicated a close relationship between the change in sales methods (P5), which was confirmed by the majority of respondents, and the goal they wanted to achieve (P7). The overwhelming response from the respondents was that it was the "increase in satisfaction of consumer needs" and "food safety". Related to these questions is the direction of these changes, e.g., online (P6), at a close distance. The P6 variable X connects, albeit at a slightly greater distance, with the pair mentioned above, i.e., 5 and 7. This triad of very closely related variables testifies to the importance of the consumer in the organizational philosophy in the stores studied. Any changes in sales were with these needs and safety in mind.

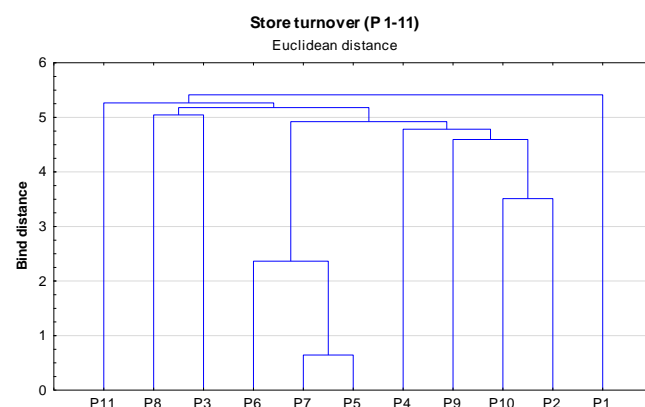


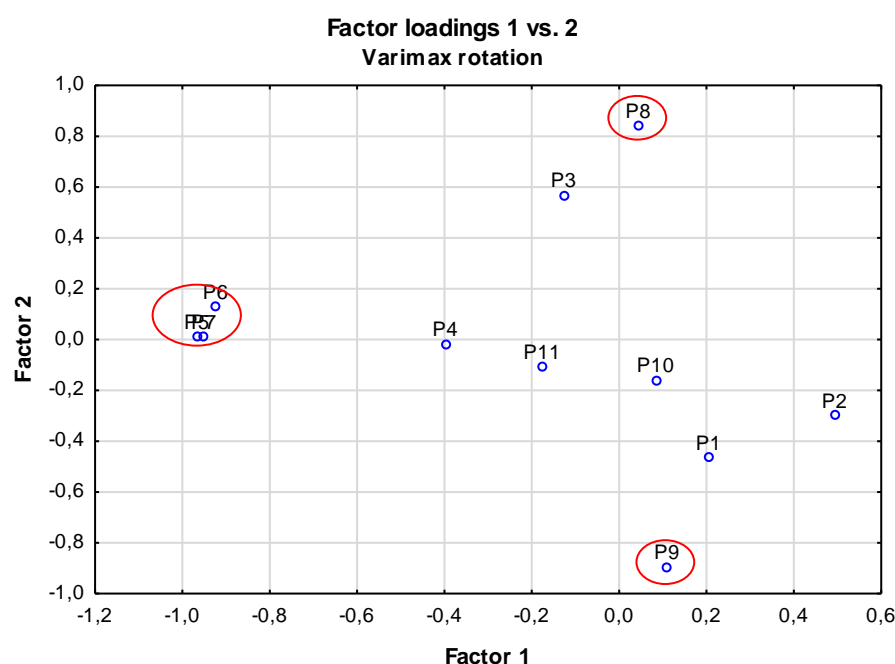
Figure 1. Tree diagram for respondents' views of food turnover in stores.

In line with the logic of dealing with the consumer, the next structure of links, but at greater distances, included the quality of food products P2 with their price level (P10), the increase of which was indicated by 85% of individuals, and then with the expected

changes in the types of products in the basket in favor of eco- and pro-health, producer brands (P9). It turned out that the above three questions were strongly associated with losses (P4), which according to the respondents were about 10–30% and were caused by excessive inventories (as many as thirteen indications), inadequate product quality, and in seven cases, fewer customers. This linkage structure clearly indicated the importance of product quality and prices to consumers.

The next two variables P3 and P8 link food product losses to their sales structure, which only changed in five units. Therefore, this linkage was rather weak, as indicated by the large linkage distance, albeit substantively justified. All the variables discussed so far are linked to question P11 about the reasons for the increase in commodity prices and ultimately have an impact on the sales volume (P1), which decreased in 40% of the surveyed facilities, increased in 35%, and remained the same in 25%. Exploring the phenomenon of the reasons for the price increase in food retail stores in the questions, it was found that they were different; for example, the following were indicated: increase in taxes and fees, wholesale purchase prices, and employee wages and insurance costs of employed people.

The results of the principal components analysis presented for the questions related to the implementation of food products' trading by stores, which is part of the performance of social functions (Figure 2 and Table 1), confirmed the dominance in the first component of the variables with loadings of a magnitude higher than  $|0.750|$  P5 (−0.966), P6 (−0.923), and P7 (−0.950). They were responsible for 29.11% of the total variability of the data. It is worth recalling that these variables form one compact group in the tree diagram in Figure 1. The dominant variables in the second component belong to the different subgroup in Figure 1. On the other hand, the second component was dominated by variable P8 with a high loading value of 0.840 and variable P9 with a factor loading of −0.897, which were responsible for 19.93% of the total variation. In the third component (axis perpendicular to the plane of Figure 2 (Factors 1 and 2)), significant negative values were reached by variables P10—price level (−0.870) and P4—loss level (−0.707), which belong to the subgroup of variables in Figure 1. The fourth component was dominated by variable P11—reasons for price increase (0.887), which in the tree diagram (Figure 1) combines all other characteristics. The three factors' shared about 70% of the variability of the data (see Table 1).



**Figure 2.** Classification of principal components for questions P1–P11. In fact, P10 is under the plane, and P22 is above the plane of the drawing.



**Table 1.** Factor loadings of principal components for questions P1–P11 to assess function performance (F1–3).

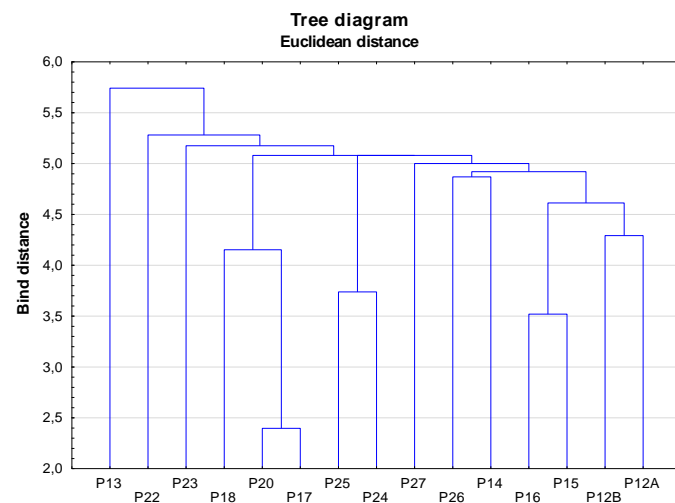
Variable (Question)	Factor Loading 1	Factor Loading 2	Factor Loading 3
P1	0.205	−0.465	0.300
P2	0.494	−0.299	−0.655
P3	−0.127	0.566	0.162
P4	−0.398	−0.016	<b>−0.707</b>
P5	<b>−0.966</b>	0.010	0.035
P6	<b>−0.924</b>	0.127	0.032
P7	<b>−0.950</b>	0.009	−0.031
P8	0.044	<b>0.840</b>	0.128
P9	0.110	<b>−0.897</b>	−0.154
P10	0.084	−0.159	<b>−0.870</b>
P11	−0.179	−0.109	−0.052
Share (%)	29.1	19.9	16.8

Figure 1 shows a positive evaluation of the performed functions F1 (food security) and F2 (satisfaction of preferences), which were the subject of the study. However, it should be emphasized that the effectiveness of the performance of Function 3 by the trade units during the pandemic, i.e., “disciplining the increase in the sale price of goods due to the prevention of a reduction in the purchasing power of the population” was conditioned (determined) to a large extent by a set of factors at the meso and macro level, i.e., externally. The above analysis indirectly answers the first question of the research problem that the pandemic in 2020 did not cause a reduction in food security in terms of access, availability, structure, and quality of food in meeting consumer needs by food retail in the study region.

To sum up, we concluded that the results of the analysis enabled a positive verification of the hypothesis H1 in terms of the performance of social functions F1 and F2. Among the social objectives, the most important ones turned out to be: the increase in the satisfaction of consumer needs and food security, in the quantitative, qualitative and structural aspect. We note that, in the opinion of the respondents, the performance of function F3 during the pandemic was determined more exogenously, and the internal actions of stores in this regard were not linearly dependent on their type of specialization (TYPE and SPEC).

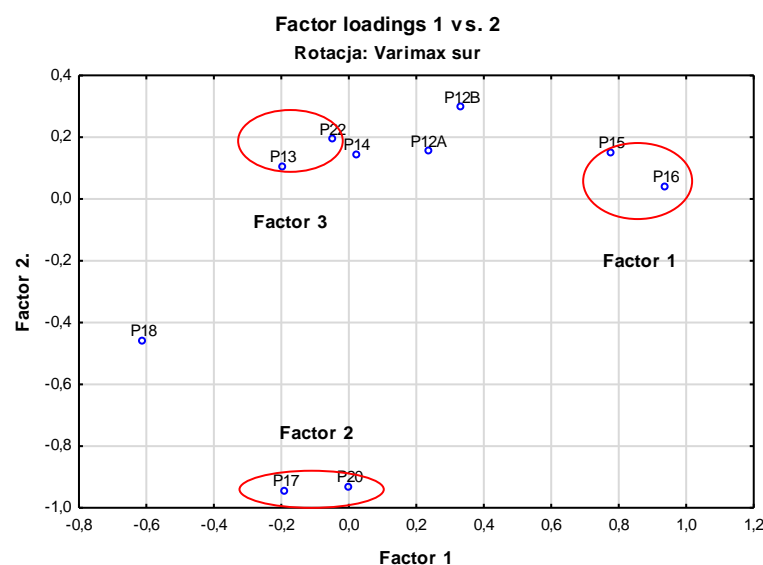
### 3.2.2. Performance of Economic Functions

Due to the uniformity of the answers to two questions: P19—whether employees were trained on COVID-19) and P20 (whether employees adhere to the principles of GHP, GMP, HACCP, ISO 2001, etc.), they were, for formal reasons (lack of variability), omitted from further analysis. This is because in both cases, only a “yes” answer was received. Figure 3 presents a tree diagram for the remaining variables (P12–P28) of an economic nature. They fit into the economic functions performed by trade units: development, transaction, distribution, control, and information.



**Figure 3.** Tree diagram for tangible, intangible, and organizational capital variables.

The observed agglomeration of variables included three types of capital (tangible, intangible, and organizational). The questions were mixed with each other in their distribution, which indicated the interactions between these capitals. Several clusters of different sizes are observed in Figure 3. Respondents from 55% of stores stated that they did not invest in new cold chain equipment during the pandemic period (P12A), and 60% of stores did not invest in developing automation and electronic communication systems (P12B). Therefore, the two questions about their purchase (12A and 12B) form a subgroup that combines with the questions about possible staff reductions (P15 and P16). Indeed, a reduction in employment occurred in seven units, with two even exceeding 30%. The work factor activities of the companies affected the productivity of the employees, which was indicated by the respondents as “increased” in nine cases, decreased in four, and unchanged in the rest. This justifies the connection with the double of the variables: labor productivity (P14) and (P26)—security in the structure of the organization, which in 60% of the stores was strengthened and in none was weakened. Then, from Figure 4, there is a connection with variable (P27)—increasing the quality control of the products sold. It is worth noting that 80% of respondents confirmed its tightening during the pandemic period.



**Figure 4.** Classification of principal components for question group 12A-22. P13 is under the plane, and P22 is above the plane of the drawing.

The discussed cluster was connected to a double of variables related to employee and management training in the case of job change (P24 and P25) and a triad consisting of variables (P17)—change of employment contract, (P20)—employee adherence to GHP/GMP, HACCP, ISO 9001 (only in four cases was there a response “not always”), and further away with P18—reinforcement of knowledge about COVID-19 by company management (there were only positive responses). This whole set of variables connected in turn to variables (P23)—whether employees suggest organizational improvements in the store (60% of affirmative responses) and (P22)—whether they use promotions more often than before the pandemic (60% of affirmative responses). The whole was combined with the variable (P13) “Has the use of fixed assets been reduced” (75% of responses “yes”).

Figure 4 shows the relationship of the principal factors, which agreed very well with the clustering using the tree method. The variables P15 and P16 showed close to unity values of Component 1 and low values for the others. In contrast, variables P17 and P20 had negative values close to  $-1.000$  for Component 2 and close to zero for the others. On the other hand, variables P13 and P22 are below and above the plane of the figure at a distance of about  $|0.900|$ , which means that trade reduces the financing of fixed assets in the first case and uses promotions more often. In turn, Table 2 shows the factor loadings.

**Table 2.** Results of principal components analysis for economic function performed by the studied entities.

Variable (Question)	Factor Loading 1	Factor Loading 2	Factor Loading 3
P12A	0.237	0.151	0.135
P12B	0.336	0.293	0.276
P13	−0.196	0.101	<b>−0.868</b>
P14	0.023	0.140	0.093
P15	<b>0.779</b>	0.148	0.069
P16	<b>0.940</b>	0.037	0.073
P17	−0.187	<b>−0.948</b>	0.062
P18	−0.608	−0.463	0.088
P20	0.003	<b>−0.936</b>	−0.122
P22	−0.048	0.190	<b>0.834</b>
Share (%)	22.80	21.31	15.83

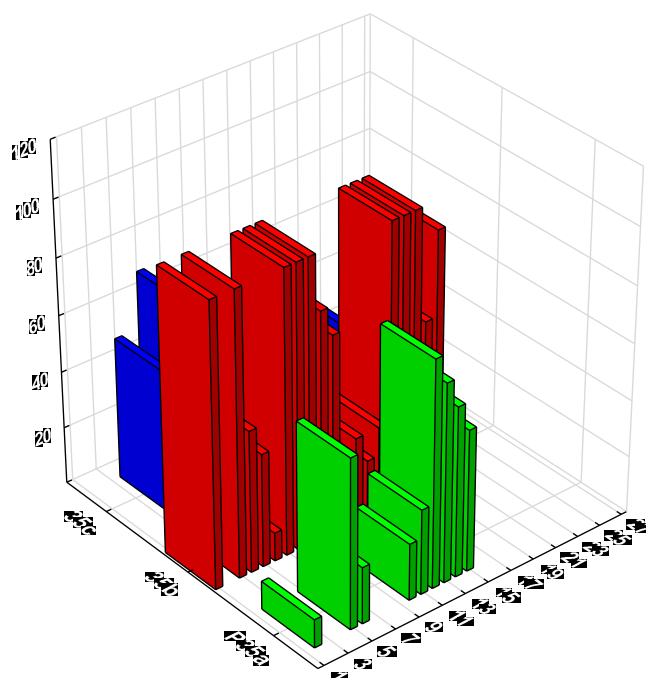
In conclusion, let us remember that in this part of the work, the performance of economic functions was tested through questions on the use of tangible and intangible capital. The specific question “Which factors influenced the performance of the function” (see Section 2.4 of the paper) was answered. Based on the analysis performed, we concluded that there were three key factors determining the degree of performance of economic functions by food retailing during the pandemic period. The first factor ( $P15 = 0.779$  and  $P16 = 0.940$ ) was related to employment; the second factor ( $P17 = 0.948$  and  $P20 = 0.936$ ) reflected changes in the employment relationship and compliance with hygiene rules; the third factor was related to the degree of the use of fixed assets ( $P13 = -0.868$ ) and promotion ( $P22 = 0.834$ ). These three factors explained about 60% of the total variation in the data in this category. The analysis showed that during the second pandemic period, functions related to current, operational activities were more important to stores than development activities. Respondents also indicated that intangible factors determined the effectiveness of function performance during this period.

### 3.2.3. Implementation of Logistics and Control Functions

The next two issues presented in the interview with store managers related to supply chains and their security. They fit into the performance of the logistics and control function (F4) by food retailing. In the interview presented here, it was reflected in the questions characterizing suppliers in terms of security of supply and ownership form.

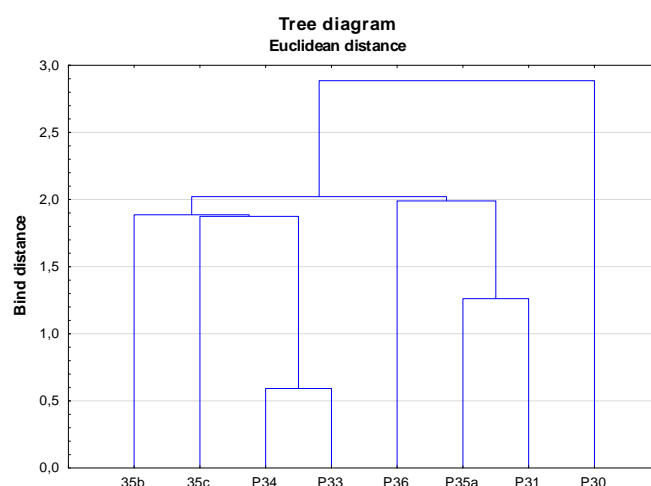
When asked about changing existing suppliers (P30), 75% of respondents answered that there was no need to do so. This was the result of the stability of supply recognized by

85% of respondents (P29). On the other hand, when asked (P31) about the reasons for a possible change of suppliers, only three mentioned unfavorable contractual terms, a lack of trust, or untimeliness in the case of domestic suppliers (P35a). Almost all respondents (95%) believed that there was no change in the share of imported goods in the sales structure. The next three questions concerned the sources of supply, namely: from individual or chain domestic suppliers (P35a), Polish wholesalers (P35b), or foreign wholesalers (P35c). The analysis of the answers showed that the dominant share in the supply of food products was held by domestic wholesalers. Eight of them supplied 100% of the goods, five others more than 50%, and another six smaller quantities. Individual Polish suppliers supplied five stores with half of the food sold. Six foreign wholesalers supplied between 10% and 70% of the store's food. To sum up, it can be said that the share of foreign entities in the supply of stores was only about 10% and of individual Polish ones about 20%. A visualization of the above diagnosis can be found in Figure 5, which shows a three-dimensional distribution of the relationship between the percent share of individual domestic suppliers, domestic wholesalers, and foreign suppliers in the total store supply.



**Figure 5.** Supply share diagram for stores. Axis explanations: X—store number (1–20), Y—supplier: P35a—individual supplier, P35b—domestic wholesaler, P35c—foreign wholesaler, Z—supply share in percent.

In turn, Figure 6 shows in the form of a dendrogram the connections between the part of the questions concerning supply chains in the supplied stores. The analysis of the links between questions P30 “whether there was a change of product suppliers” to P35- “the degree of supply of the store from family suppliers” was performed by the classification tree method. For formal reasons (very low diversity of answers—90% of “yes” answers), Question 29 about the stability of supply chains could not be included in this analysis.



**Figure 6.** Tree diagram for supply chains of function execution.

In Figure 6, we observe two groups of variables that are linked by the variable P30 about the possible switching of suppliers and its directions. In one of the subgroups, two questions asked about the firm's participation and effectiveness of the so-called "protective shield" (P33 and P34). Its effectiveness is linked on the dendrogram to P35c and P35b, which are linked to the share of foreign or Polish wholesalers in the store supply. In the next group, the reasons for changing wholesalers P31 were quite loosely linked to the involvement of individual or network suppliers (P35a) and affiliation with merchant organizations (P36). In the tree diagram, both are linked to the question about the overall influence on a possible change of trading partners.

The data in Table 3 indicate the strategic factors for supply chains to perform logistical and socioeconomic functions. Factor 1 included three variables. These included the participation and effectiveness of the protective shield by the state (P33 and P34) and the low involvement of owners in merchant organizations (P36) with a negative value of factor one. In Factor 2, with opposite signs, were responses about the instability of supply chains (P29) and the need to change suppliers (P30) (domestic or foreign). Finally, Factor 3 showed a contrast between the importance of individual (P35a) domestic suppliers and domestic wholesalers (35b). The three factors accounted for 79% of total data variability.

**Table 3.** Results of principal component analysis for supply chains and function performance.

Variable (Question)	Factor Loading 1	Factor Loading 2	Factor Loading 3
P29	−0.285	<b>−0.787</b>	0.151
P30	−0.107	<b>0.725</b>	0.225
P33	<b>0.955</b>	0.092	0.030
P34	<b>0.975</b>	0.072	0.057
P35a	−0.071	0.187	<b>−0.898</b>
P35b	0.091	0.290	<b>0.902</b>
P35c	0.193	−0.651	−0.266
P36	−0.772	0.285	−0.133
Share (%)	32.52	22.11	22.40

Finally, a matrix consisting of all the variables used above was constructed. This matrix was used to perform principal component analysis and to extract the dominant characteristics that differentiated the studied organizations. This resulted in a smaller dimension of the matrix subjected (number of questions) to principal component analysis and classification. The graphical result of this analysis is shown in Figure 7.



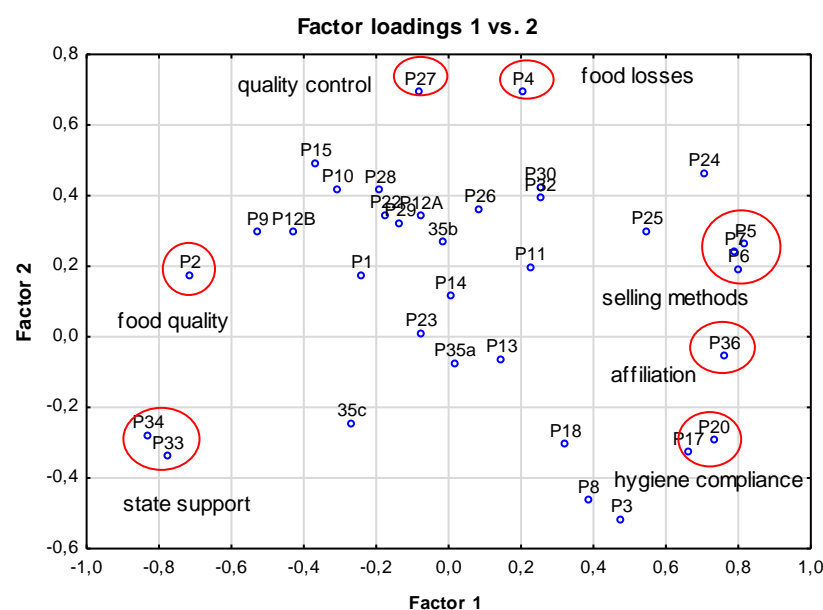


Figure 7. Principal component analysis conducted for most of the variables.

There were three variables with a high first component value (0.80) in the first component. These variables are characteristic of the P5–P7 sales methods. The results indicated that the sales methods (P5) were changed in most stores (about 60%) during the pandemic. However, the in-depth question “whether towards online sales” received only four positive responses. In contrast, when asked why methods were changed (P7), almost half responded that it was to meet customer needs and safety. A slightly lower absolute value of the first component was obtained for the question about product quality (P2), which according to the assessment of the interviewees has improved.

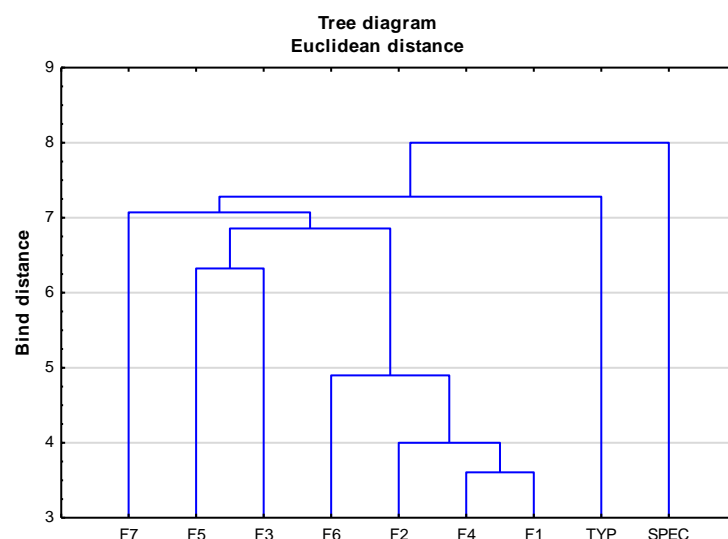
Significant magnitudes of the second component were obtained for the question about the status of merchandise quality control, which was strengthened in 75% of the stores. The main reasons for this phenomenon were excessive stocks and fewer customers, which were mentioned by about 80% of the interlocutors.

It can be concluded that the quality of goods, quality control, and sales methods used played a leading role as causal factors, in the activities of the surveyed food trading units regarding supply chains. It also turned out that about 33% of the stores made use of the “protective shield”. Thus, it can be concluded that in the strategy of the activities of the studied trading units, the instruments of state policy mitigated the barriers to the implementation of their functions during the pandemic. The results obtained through the conducted interviews indicated that most of the surveyed food trade stores performed the F4 function. Thus, they supported the conclusion to accept hypothesis H4 and positively influenced the realization of functions F1, F2, F5, and F6.

### 3.2.4. Degree of Performance of Food Retailing Functions as Assessed by Respondents (Likert Scale)

In periods of pandemic crises, there is not only a change in values among both consumers and representatives of the production and service spheres, but also an increase in uncertainty about the future, which makes it difficult to make choices. An example of this phenomenon during the research was the attitude of store managers toward the question “Which function carried out by your company was the most important” out of the seven listed. It turned out that all respondents gave them equal weight, i.e., the highest rating of “5”, thus indicating that all functions were very important. On the other hand, their differentiated answers regarding the evaluation of the degree of realization of the functions, given during the empirical study, were used in the classification analysis by the linkage tree method (complete linking, Euclidean distance). Multivariate techniques in the Statistica package were used for twenty stores and seven variables describing the degree of

function realization (scale from 1–5) during the pandemic period. The data matrix thus had dimensions of twenty rows and seven columns. In the evaluation, the lowest score was assumed to be “1”, and the highest score was assumed to be “5”, which was taken as a benchmark. It turned out that Functions 1 and 4 were located relatively close and merged into a larger group with Function 2 and, further down, with another function, F6 (Figure 8).



**Figure 8.** Dendrogram for supply chains of function execution.

The interpretation of this result is consistent with the logic of action, through which the success of the company in the market is expected. In the time of the pandemic, managers of retail stores saw the realization of functions related to social sensitivity [66]. This is because the first subgroup of functions, receiving the highest scores, preferred the security of access to the quality and quantity of food for consumers—F1 and the conditions for its purchase—F4. These two were joined by the variable F2—satisfaction of preferences and structure of food offered and F6—securing jobs for employees through flexible solutions. Let us remember that a safe worker in the health and professional sense is not only a potential purchaser of food products, but first of all, it is human capital with competences, necessary for the realization of other functions, and satisfying consumer preferences by securing an appropriate structure of the offered food. This analysis gave the answer to the specific question: What is the assessment of the degree to which the function has been performed? (see Section 2.4 of the article).

The next, separate subgroup of evaluations of functions performed by food retail stores was formed by variables F3 (disciplining price increases) and F5 (developing the store’s potential to increase its position in the market). The two subgroups were unified by variable F7 (consumer education and cognition function through promotions used). We can see that function F5, in the shadow of which there is profit, which is a source of financing for new investments, modernization, and restructuring, combined with function F3, whose score in turn meant that controlling price growth was difficult. This was not facilitated by the rising prices of labor employed, the cost of buying imported products, energy prices, transportation, etc. The growth of firms requires profitable operations and profit generation over a period of time. This is difficult, but possible even in the pandemic period, by creating a loyal customer whose security is most important for companies and through the function F7. It connected the two previously presented groups of function evaluations in the graph into one whole.

This was followed by linking the ratings of the analyzed functions to the type of stores (TYPE), e.g., supermarket, discount store, etc., and finally, to their retail specialization (SPEC), e.g., general merchandise, bakery and confectionery, meat and charcuterie. However, the experimental material did not allow us to accept Hypothesis 2 about the

interdependence of the degree of the performance of social and economic functions by food retail stores with their type (TYPE and SPEC). We thus obtained the result for the specific question: Does the type of shop influence the importance of the function in the managers' evaluation? (see Section 2.4 of the article). In the presented grouping of evaluations of the realization of functions by managers of stores, we should take into account a bundle of objectives (market, economic/financial, social) in the management of the company and to identify the success of the company by participation in creating the conditions of social security (Table 4).

**Table 4.** Degree of the function performance.

Function *	Mean	Stand. Dev.
F1	4.60	0.68
F2	4.50	0.76
F3	3.45	0.95
F4	4.95	0.22
F5	3.85	1.39
F6	4.40	1.19
F7	3.50	1.43

\* The functions are explained in Section 2.3.

At this point, it should be emphasized that these questions were answered by all the respondents, and they also listed the impediments to the performance of the stores' functions. Among them we can find internal factors, which included: decisions, organization of sales, increased costs (employment, personal protective equipment), and management, which ensure safe purchasing conditions for consumers and staff (F4), secure the quantity and quality of the commodity (F1), satisfy the preferred structure of food (F2), and limit price increases (F3). This was due to the high mean values and low to moderate standard deviation. Other barriers, so-called external, from the point of view of the effective performance of functions by food retail units, included: fewer customers, difficult access to products, especially in the initial period of the pandemic (4), government policy, frequent changes in regulations (institutions), supply of poor-quality products, theft, staff illness, management, low availability of eco-products (fruits), and their high purchase prices of goods), consumer environment (2 times), consumers (2 times).

Summarizing this strand of considerations, it can be indicated that the SARS-CoV-2 pandemic accelerated and highlighted the integration of the objectives of supply and demand actors in the food market. The previously mentioned business model based on the concept of sustainable development is shaped, which, by providing value to all stakeholders, guarantees the company's success not only now, but also in the future [67].

#### 4. Conclusions

The study of secondary sources regarding the research problem defined in the article indicated that during the first year of the SARS-CoV-2 pandemic, the degree of income polarization of the population and imbalances in the global food market increased. This had negative consequences for the food security of many social groups, mainly in countries with low food self-sufficiency and in underdeveloped regions. In Poland, as a country with food surpluses of basic agricultural products, this problem did not occur, although there was a barrier in economic accessibility for some social groups of low financial standing, the effects of which were leveled by state social policy.

The empirical analysis carried out in the Lubuskie Region, as a less-developed voivodship in Poland, indicated that the food retail trade also played a positive role in reducing the negative effects of the pandemic on society, by effectively performing its social and economic functions. We should remember, however, that the functions associated with an organization's goals evolve over time. This is influenced by the change of both the world economy (macroenvironment), as well as the competitive environment (microenvironment), and most importantly consumers, as well as the capacity of the competitive potential of

the units of this trade themselves. Therefore, a conclusion can be made in terms of future research, in the direction of developing scenarios for the evolution of the functions of food retail companies and the degree of their implementation, taking into account the direction and dynamics of these changes.

The performed research indicated that the food retail trade in Poland proved resilient to the impact of the pandemic and did not limit the performance of its functions, although for some of them, the effectiveness of this defense decreased as the crisis prolonged. This was caused by the superimposition of the negative barriers associated with the pandemic of other so-called accidental, climatic, etc., phenomena of a catastrophic nature. We can mention, for example, the impact of the spring drought on the increase in prices of food products, floods, fires, or the Suez Canal disaster on reducing the efficiency of transnational production–supply chains. The results of the work carried out and presented to the reader allowed us to identify several factors that determined this resilience residing both in the processes of management and in the sphere of the superstructure.

Referring to the problem questions posed in the Introduction, we state that the respondents almost equally treated their functions, both the basic and the additional F7 (information and education), giving them the highest rating of “5”. On the other hand, the evaluation of the efficiency of their performance varied. The social functions F1, F2, and F4 were assessed best. It also turned out that the performance of the examined functions in light of the assessment of the respondents, who were store managers, did not depend on their type, i.e., type and specialization. Therefore, the experimental data did not allow us to accept the hypothesis H2.

In the first year of the pandemic, food retail units used intangible factors that built the aforementioned resilience to pandemic threats to perform the functions. At that time, the criterion of product quality (in purchase and sales transactions) in supply chains became important for stores, as an element of credibility and competitiveness for the customer, as well as a criterion for adapting sales methods to the customer’s needs. Therefore, the quality control of products and work had to increase. This aspect of the implementation of the logistics and control function was evaluated positively by the respondents. Overall, the analysis performed confirmed the truth of the three generated hypotheses (H1, H3, H4) and their acceptance. It was concluded that:

- Negative phenomena due to the 2020–2021 pandemic, which occurred in Poland, did not have a reductive effect on the performance of its socioeconomic functions in food retailing;
- The main barriers to the performance of the functions by food retailing were mainly external factors;
- The fulfillment of the logistic function by food retailing depended mainly on the internal factors of individuals, conditioning the efficiency of supply chains.

In the period of the SARS-CoV-2 pandemic, there were major changes in the area of management at the macro, meso, and micro levels, both in the real sphere concerning production and service activities, including food trade, and in the sociocultural sphere of society. From the perspective that includes the supply side of the economy, it was noticeable that entities strove to protect the social functions performed so far in the concept of sustainable development. Let us note, however, that participation in the emerging Economy 4.0 is possible only through an increase in investment in innovation and the growth of position in the international market, which does not allow neglecting an important development function. In the pandemic period, there have been threats to the emergence of a gap in this regard. This was indicated by the presented research among food retail units. Therefore, there is a need for broad support of both of these activities within the framework of the state policy in Poland through the so-called protective shield. This is aimed at enabling, despite the ongoing pandemic, the implementation of sustainable development strategies (social functions) and making a simultaneous breakthrough in the modernization and development of lagging industries, including retail (economic

functions), for the necessary processes of their transformation to Economy 4.0. EU directives clearly emphasize these issues in the field of food retailing [68,69].

Previous observations on food retailing confirmed [70] that the progressive polarization of these units has slowed during the pandemic. Many small stores are emerging that are better able to adapt to new consumer preferences, but they have a smaller assortment of products to choose from and often operate under consumer demand (similar to pharmacies) due to low economic power. This led to the conclusion that in order to strengthen their ability to perform socioeconomic functions, they will have to gain economic potential by creating a network of mutually supporting units of different types, e.g., cooperative, family (limited partnership), alliances, or creating producer–trade groups based on contracts of different organizational and legal forms. Currently, there is a lack of regional supplier networks and exchanges, e.g., cooperatives. The view presented by the authors applies to the entire industry. In the case of each food retail unit, more or less crisis phenomena may occur, which should be quickly counteracted by implementing an appropriate business model.

On the other hand, large food retail units, having a wide selection of products, increase online sales, often combined with the delivery of goods to the customer's home, and allow direct self-service to the consumer. These are the ones that mainly create added value in the economy and new investments. The realization of both paths simultaneously, i.e., modernization (economic function) and ensuring the efficiency of performing social functions by food retailing, in economically weaker regions will not be possible in times of pandemics, without external support by EU policy and the national program "New Deal".

A recommendation can be made here for future research with extended analytical instruments and a larger sample of respondents, based on the framework set out by this paper. More research is undoubtedly needed to bridge the identified research gap in general and specifically in countries and regions, in which the COVID-19 pandemic has disrupted the food markets and/or regions facing frequent disruptive phenomena in the food chain. In addition, comparative studies between different regions or countries could help deliver further insight into the resilience of food retail functions and instruments of support.

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