



# Agri-Food Logistics

**4<sup>th</sup> International Forum on Agri-Food Logistics**

***‘Entrepreneurship, Innovations and  
Technologies for Sustainable Development  
of Agri-Food Supply Chains under  
conditions of uncertainty’***

**Scientific editorial board by  
Karol Wajszczyk  
Magdalena Kozera-Kowalska**

**Poznań, Poland  
June 23-24<sup>th</sup>, 2021**



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## **4<sup>rd</sup> International Forum on Agri-Food Logistics**

# ***‘Entrepreneurship, Innovations and Technologies for Sustainable Development of Agri-Food Supply Chains under conditions of uncertainty’***

**Poznań, Poland  
June 23<sup>th</sup> -24<sup>th</sup>, 2021**

Conference Venue:

**Poznań University of Life Sciences**

© International Forum on Agri-Food Logistics  
Published by Poznań University of Life Sciences  
ISBN: 978-83-7160-994-7  
Electronic version by:  
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## Preface

Dear Forum Participants,

on behalf of the Department of Law and Enterprise Organisation in Agribusiness, Faculty Economics at Poznań University of Life Sciences we have the honor to welcome you to the 4<sup>th</sup> **International Forum on Agri-Food Logistics**.

The United Nations' Sustainable Development Goals (SDGs) are today the most crucial signpost of sustainable development for all economic, social and environmental operators. They also provide vital guidelines for the development of logistics in the agri-food market, which is an essential aggregate of the economies of almost all countries. Their implementation is particularly relevant to the functioning of sustainable food supply chains. Today, the most critical objectives referred to by the activities of food supply chains is SDG 9 in linkage with SDG 17. The first one concerns building resilient infrastructure, promoting sustainable industrialisation and supporting innovation while the second challenges partnerships to achieve the goals. The primary task of supply chains in this context remains integration and cooperation, based on which innovations generate in collaboration with both suppliers and other stake holders in the supply chain. It leads to open innovation, builds sustainable development targets and strengthens infrastructure for necessary activities within the food supply chain. It is essential to innovate and support the partners by transferring knowledge, technologies and integrate their needs and aspirations into strategies implemented within the most efficient and effective global supply chains. To make the 2030 Agenda a reality, broad ownership of the SDGs must translate into a strong commitment by all stakeholders to implement the global goals. The Forum aims to help facilitate this engagement by opening scientific discussion on the ways to align food supply chains practices with UN SDGs, in particular, SDG 9 in linkage with SDG 17. They embrace ISO 14001 environmental management system, strategic supply chain collaboration, supply chain integration system, supplier sustainability assessment and corporate social responsibility (CSR). Sustainable food supply chains are a guarantee of ensuring countries' food security in terms of quantity and quality while reducing the negative impacts on the environment. The task is not an easy one. The dynamic changes in eco-systems like technological development (e.g. digitisation processes), internationalisation and globalisation of supply chains, social changes (which generate pressure for the greening of logistical operations, especially material recycling and reduction of waste) makes it even more difficult. The conditions of uncertainty caused by the COVID-19 pandemic, even more, highlighted all the previous challenges. Its occurrence contributes to changes in the existing logistical paradigms. The changes that are taking place in global supply chains (seeking solutions for, among other things, supply disruptions, new ways and techniques of monitoring and controlling them, etc.) have provoked heated discussion both among practitioners and scientists. They jointly undertake to work out solutions that would make it possible to anticipate such situations in the future, or at least partly counteract them, or mitigate their effects. Therefore, the integration of the research community with the business community by presenting the results of scientific research and practical experience in the logistics of the agri- food chains is the aim of the Forum.

This book presents an exchange of views and proposals for solutions in the above mentioned issues presented in Poznań on June 23-24, 2021 at the 4<sup>th</sup> **International Forum on Agri-Food Logistics** titled: *Entrepreneurship, Innovations and Technologies for Sustainable Development of Agri-Food Supply Chains under conditions of uncertainty*.

Karol Wajszczuk, PhD  
Chairman of Organising Committee

Magdalena Kozera-Kowalska , PhD  
Vice Chairman Organising Committee

4<sup>th</sup> International Forum on Agri - Food Logistics  
Poznań, June 2021

# Chapter I: Sustainable Agri-Food Supply Chains

## 1.1 Principles for the organization of short food supply chains in the context of sustainable development

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**Keywords:** *short food supply chains, sustainable development, principles.*

**JEL:** Q13; Q16: Q18

In order to develop vibrant rural areas, implementing the concept of sustainability in the CAP, attention should be paid to environmental sustainability. In the 1th – 3th decades of the 21th century the main challenge is the depletion of land and other natural resources and the increased risk of declining food and water supplies in the future. Desertification of the food market (by analogy with the definition of soil desertification) is a market transformation caused by the lack of fresh, local, high biological value products. Desertification is caused by the concentration of production, processing and marketing capital, which leads to the dominance of mass production. The loss of market diversity and viability is also due to changes in consumer behavior, especially in relation to the loss of cultural identity. The solution is measures to reduce production intensity and help restore natural resources (bioeconomy, circular economy), development of value chains.

Economic phenomena agriculture and nutrition always interconnected, and there is a great lack of a proactive approach to managing them in geographical areas. The purpose of the research - to identify the principles of organizing short food supply chains (SFSC) in the context of sustainable development. The logical sequence of the research: identified and substantiated SFSC organizational elements, criteria, and sub-criteria; examples (cases) of SFSC organization good practice are selected and justified; the analysis of SFSC organizational elements, criteria and sub-criteria was performed; the principles of organization, sustainable development, organization of short food supply chains, organization of local food system are compared. Methods of scientific literature analysis, good practice analysis, comparison and parallel were used in the research.

The study was done on the assumption that SFSC is the production, processing, sale and consumption of raw materials and foodstuffs based on the principles of the circular economy, which take place in a relatively small geographical area (with or without a minimum number of intermediaries), with direct interaction between producer and end user, information, knowledge, experience. The organization of SFSC is a multifaceted process and involves a variety of components. The organization of SFSC should focus on governance processes and the organizational framework of SFSC, the creation of new value, the comparison of different sales forms and processes, social, environmental and economic sustainability, not only ensuring sustainable production processes but also guaranteeing healthy, higher value-added food, social relations, harmonious market laws. The organization of the SFSC can be initiated or self-regulatory, but the organizational process itself must be in line with traditional management principles and the principles of the organization of the SFSC and local food system.

The SFSC can contribute to the Sustainable Development Goal 2 in linkage with Sustainable Development Goal 17. Principles of organization of short food supply chains have been identified. *SFSC economic sustainability* can be achieved in accordance with the following principles: balancing food supply and demand; effective order quantity; ordering systems and SFSC types; logistics and distribution; service radius: between the producer and the consumer; decision making structures; application of the principles of the circular economy. *Social sustainability*: social organization; agreements and contracts; relationship between producer and consumer, mutual exchange; application

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of social and environmental criteria in public procurement; communality; involvement and participation; networking. *Environmental sustainability*: food ethics (animal welfare, biodiversity, sustainable production and consumption); enabling policies and regulatory frameworks; enhancing the biological value of a product; geographical proximity; sustainable use of resources (land, water, etc.). SFSC are the basis for the development of the local food system, and the latter is a condition for the development of short food supply chains. Social innovation can help ensure involvement and participation. The co-creation plays an important role in stakeholder involvement and participation processes and ensures the viability of both processes. A co-creation process, which can be called learning, improvement, joint activity or product development - everything that increases the added value created together, can develop collaborative innovation - local food system that can change the direction of development of certain farms and villages.

**Acknowledgments:** The research is supported by the project No.35BV-KK-18-1-06620-PR001, which is financed from the EAFRD and the national budget of the Republic of Lithuania.

## 1.2 Sharing economy as one of the solutions for agrifood chain (*Muñiz ESTHER<sup>1</sup>*)

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**Keywords:** *food waste, economic policy, consumer decisions*

**JEL:** O13, O3, O44, Q01

The future CAP and the European Green Deal 2020 are geared towards greater cooperation for the increased competitiveness of the agricultural sector and for the dynamism of the rural environment itself. It is intended that this increased cooperation will also be developed through the collaborative economy as a model of the circular economy. In this way, collaborative agriculture would be added to the new agricultural models based on innovation and new technologies and those based on big data or agro-digital and agroblockchain, on the same basis of an efficiently connected farmer, as part of the socio-economic transformations. This is intended to support and accelerate the transformation and transition to a more sustainable model of inclusive growth. A new Action Plan for the Circular Economy is widely seen as helping to modernise the EU economy. One of the principles of the collaborative economy is the rationality of resources, which for our area of agriculture and rurality will contribute to the competitiveness of the sector. Also, given the high long-term dependence on water and energy resources for agriculture and its industry, sustainability requires an optimisation of the use of all resources, so that the collaborative economy and, more broadly, the circular economy, will not be conceived as a mere add-on in the development of the agri-food or livestock system or its industry, but will be an integral part of it. However since the collaborative economy is not perfect, it is only profitable if it is used in order to rationalise and is offered as an additional instrument, not as a substitute for others.

**Conclusions:** It is clear, in any case, that a new economic model has been imposed worldwide through the principles derived from the sharing economy, understood as a "bearer of positive externalities for the community". In that way, in this paper will explain the main contributions of the sharing economy for the sustainable development of agrifood supply.

### 1.3 Performance and challenges in the value chain of the *Anadara Tuberculosa* (concha prieta) bivalve mollusk in Ecuador

(Eveligh PRADO-CARPIO<sup>1</sup>, Manuel QUIÑONEZ-CABEZA<sup>2</sup>, Moisés Enrique MARTÍNEZ-SOTO<sup>3</sup>, Carlos RODRÍGUEZ-MONROY<sup>4</sup>, María de Lourdes OLIVO- GARRIDO<sup>5</sup>, Christine BEITL<sup>6</sup>)

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**Keywords:** value chain, productivity, competitiveness, quality of life, bivalve mollusks

**JEL:** D24, Q22, Q56

The gathering activity of the bivalve mollusk *Anadara tuberculosa* has been developed ancestrally intuitively and spontaneously in the mangrove ecosystem, located on the coasts of Ecuador and other countries of the American Pacific.

A descriptive, quantitative, non-experimental, field, cross-sectional, and ex post facto methodology was applied in this research. The population was 886 individuals from the strata of shellfish gatherers, shellfish managers, merchants, and restaurants found in the Jambelí archipelago, in the province of El Oro, Ecuador. The type of sampling was probabilistic, random, and stratified, with a sample size of 222 informants. Four similar questionnaires were designed to collect information, validated (expert opinion), and applied to each link in the production chain. The predominant measurement scale was the Likert scale. The recorded data were statistically processed with the SPSS software through univariate tests.

The *A. tuberculosa* value chain's performance construct had three dimensions: productivity, competitiveness, and quality of life, with its sub-dimensions and indicators. It was found that the *A. Tuberculosa's* agribusiness management and value chain's performance is an interdependent system related to the production of this hydrobiological resource. In this system, the agribusiness management construct affects the value chain's performance construct through improvements in the managerial, innovative, and environmental processes

The management of agribusiness affects the productivity and competitiveness of the activity and the quality of life of the entrepreneurs and workers of the companies that make up the links of extraction, marketing, and preparation of food dishes to obtain a leadership position in the national market and to enter the international market.

The performance index of the resource value chain resulted in 75.1%, indicative of a moderate to good level, reaching a lower performance in the quality of life dimension.

Regarding the competitiveness dimension, it was obtained that for the shellfish, the operating costs are higher for the province of El Oro (7.6 USD per day) than for the Esmeraldas province (4.0 USD per day), both in Ecuador.

The operating profit margin was estimated to be higher in the gatherers link (76.03%), followed by shellfish managers (69.53%), restaurants (54.07%), and merchants (between 13% and 10%).

Data on quality of life indicate that almost 90% of those who participate in the shell production chain have quality of life levels that range from fair (39.2%) to good (49.5%), because some links such as restaurants have adequate income, but also have a relatively good infrastructure for housing and public services, except for excreta disposal. However, it should be noted that the majority of shellfish gatherers (49.3%) and shell managers (66.7%) are at a regular level.

Poznań, Poland, June 23-24, 2021

The analysis carried out allows us to infer that the *A. Tuberculosa* is a product with great potential for market development. The challenges identified are: preserve the mangrove ecosystem, apply reforestation techniques; develop low-intensity aquaculture techniques; administrative measures such as controlling sowing and harvesting periods, extraction, resource size; purification of the shell, establish the origin denomination to access international markets with higher added value; organizational and marketing innovations, design and implementation of a new value chain; identification and development of market niches nationally and internationally

It is concluded that there is an exhaustion of the *A.Tuberculosa* business model due to the overexploitation of the resource, low levels of innovation, sanitary quality and added value, and poorly structured administrative processes. All this affects the poor performance of the value chain that causes stagnation and reduction of production, loss of competitiveness, and deterioration of the quality of life of those involved. Therefore, it faces the challenge of transforming itself to achieve higher levels of competitiveness and sustainability.



## 1.4 Reflect LCA of composted manure and ash from poultry litter in fertilization by Pigovian approach (Takahiro YONEYAMA<sup>1</sup>, Masako MORIOKA<sup>2</sup>, Yasushi SEMBOKUYA<sup>3</sup>)

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**Keywords:** Life cycle assessment, Poultry, Pigovian approach, Manure, Transportation

**JEL:** Q21, Q52, Q57

**Introduction:** The livestock sector is responsible for 18 percent of greenhouse gas (GHG) emissions measured in carbon dioxide (CO<sub>2</sub>) equivalent. Livestock are also responsible for 65 percent of nitrous oxide (N<sub>2</sub>O), a large majority of which is from manure [1]. Appropriate management of manure and expansion of the usage of composted manure are important for GHG reduction. As breeding and feeding technologies have improved, the concentration of animals in some areas has increased. Poultry production generally includes monogastric species rather than other animals, and thus increases the trend towards intensification and industrialization. Growing concentrations of animals in large units near cities are associated with greater pollution. Poultry production in Hokkaido, which is the breadbasket of Japan, also tends to concentrate on the coast because poultry farmers in Japan purchase a large amount of imported feed.

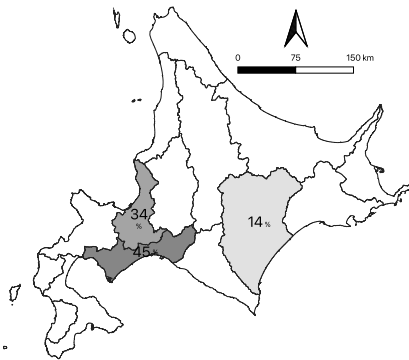


Figure 1. Distribution of poultry heads in Hokkaido, Japan. Source: *The statistical survey on livestock in Japan (2018)*.

Due to the high intensification of poultry and lack of area for feed crops, poultry farmers in Japan need to find lands for application of manure from poultry litter. In recent years, regions where poultry litter is not handled during composting have turned to the generation of electricity and the use of ash as fertilizer.

The enterprise sells ash fertilizer products to clients at a high price regardless of GHG emissions during the distribution process.

Moreover, composted manure and ash from poultry litter are competitive with chemical fertilizer. Crop farmers, who are expected to use compost or ash from the standpoint of nature conservation, may opt for chemical fertilizer instead, depending on those prices.

Inducing a Pigovian tax is one solution for correcting the undesirable distribution. Closing the price difference between compost or ash, and manure and chemical fertilizer, leads crop farmers to use appropriate fertilizer. These price differences are equivalent to a Pigovian tax.

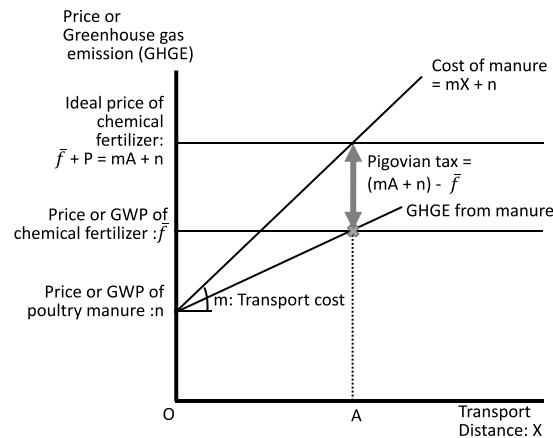


Figure 2. Economic framework.

The aim of this study is to apply a life cycle assessment (LCA) to assess the environmental impact of two poultry litter uses and chemical fertilizer. Given the environmental burden of each fertilizer product, the added value of this study is to highlight the Pigovian tax on fertilizer.

First, ash from poultry litter is compared with composted manure in LCA, and the appropriate transport length is determined for each usage of litter manure. Second, by calculating the price difference between the cost of compost and ash from poultry litter and the cost of chemical fertilizer, the Pigovian tax on fertilizer is revealed.

**Methods:** LCA has been used extensively to assess agricultural systems and compare alternatives “from cradle to gate,” because the agriculture and food sectors cause major environmental impacts. Recent studies have been conducted not only on environmental but also on economic aspects [2–3]. However, these studies have not yet indicated who will take on environmental costs and how much money is required for environmentally friendly practices. Additionally, the use of poultry litter, including the transportation process, has been assessed by LCA [4]. The system boundary incorporates the production and transport stages. The production process includes composted manure, litter ash, and chemical fertilizer in the relevant industries. Environmental burdens are generated from using electricity and fuel for running waste treatment plants. A biomass burning power station generates poultry litter ash and electricity, which are used to run the plant. As alternative approach to manure management is chemical fertilizer, the production process of which runs from mining to product distribution. The transportation stage includes manures transport from each waste treatment plant to agricultural land by 4-ton tractors that use diesel fuel. The functional unit is 10 ares agricultural land used to spread fertilizers. Components for spreading fertilizer in 10 ares are standardized, and mineral shortages are compensated by chemical fertilizers because the ingredients of composted manure and litter ash are different. Trace gases include CO<sub>2</sub>, methane (CH<sub>4</sub>), and N<sub>2</sub>O.

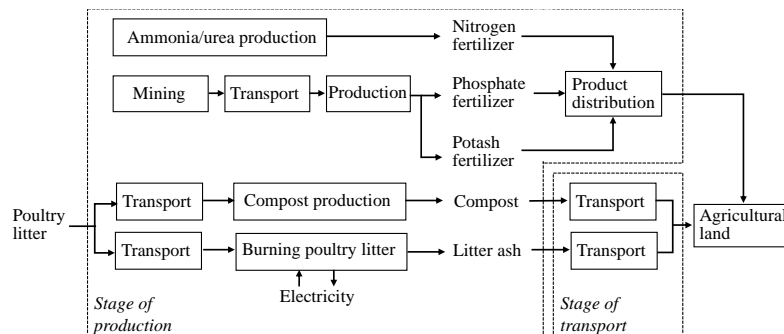


Figure 3. System boundary.

**Results:** The results show environmental benefits at the stage of the process of using composted manure compared with litter ash (Table 1).

Table 1. GHG emission of compost and litter ash.

kgCO <sub>2</sub> /10a	Compost	Ash
Electricity	33.3	–
Fuel	26.5	–
Additional chemical fertilizer	78.2	146.8
Total	138.0	146.8

Note: The basket methods was used.

The mass of ash, however, is lighter than that of compost and is suitable for transfer to farther agricultural land. In the case of the transport stage, GHG emissions from litter ash prevail in reducing the environmental burden at 91 km. The goal is to distribute composted manure within 91 km of a manure plant and to distribute litter ash beyond that distance. However, it is always possible that crop farmers who desire to use manure from poultry litter employ chemical fertilizer due to availability and low cost. Figure 4 shows the effective transport distance, cost of each fertilizer, and how much taxation on chemical fertilizer would result in a cost equivalent to manure from poultry litter. The environmental burden is the same as that of chemical fertilizer when composted manure is transferred to 204 km and litter ash is transferred to 338 km. Moreover, the price difference with chemical fertilizer per 10 ares is 2,650 Japanese yen for composted manure and 4,982 Japanese yen for litter ash.

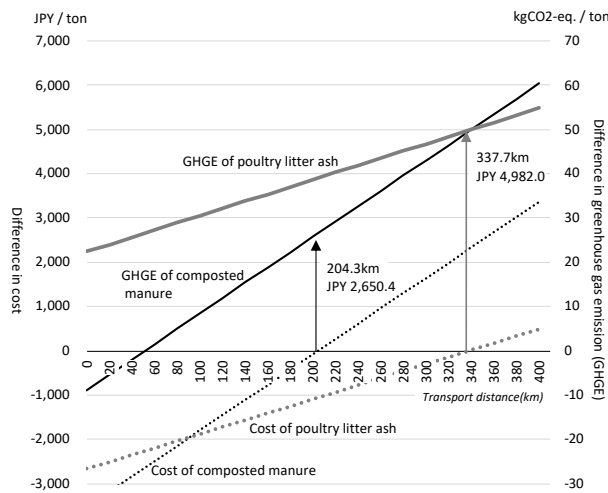


Figure 4. Transportation distance and cost difference between two types of manure usages and chemical fertilizer.

**Discussion:** In summary, this study proposes a Pigovian tax on chemical fertilizer in order to correct the imbalance of environmental impact. Property expenses of wheat production in Hokkaido is approximately 50,000 Japanese yen. If crop farmers who use chemical fertilizer are responsible for the environmental tax, the expense is increased at 5-10%. In recent years, the idea of sustainable development goals has spread widely, and the importance of social responsibility to the environment has gained momentum in Japan. Farmers in Japan, whose land area is small, need to take the initiative to set an environmental conservation action. To a greater or lesser extent, spending is inevitable. LCA is used in this analysis to assess the environmental burdens of manure and fertilizer products. At the same time, sustainable agricultural practices should commit to appropriate manuring and fertilizing. Further research to assess mineral resources and land fertility is needed for legislation related to the fertilization actions of farmers.

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## 1.5 The impact of transport infrastructure on the sustainable development of the region – case study

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**Keywords:** *transport infrastructure; sustainable development; rural areas*

**JEL:** R11, R420

The transport infrastructure can be defined as a factor that guarantees the growth and economic development of the region, due to the functions of traversing space in terms of the movement of people and the exchange of goods. The effects of the impact of transport infrastructure on the economy of the region largely depend on how the society uses the services offered by infrastructure facilities and devices. The study examines the impact of transport infrastructure on the sustainable socio-economic development of the Wałcz Lake District.

The study examines the impact of transport infrastructure on the sustainable socio-economic development of the Wałcz Lake District. For this purpose, a survey was used, which in 2019 was addressed to large entrepreneurs from this region. The questions concerned issues such as the city's economic attractiveness and the region, its main values, factors that may help the development of the Wałcz Lake District, and the effectiveness of local government activities around regional development. In the second part of the research, indicators of sustainable development at the regional level were used. To analyse the level of technical infrastructure, in 2019 the density of hard roads per 100 km<sup>2</sup> was used, which allowed an objective presentation of the road infrastructure of the analysed area. The number of funds allocated to the construction or modernization of local roads was also analysed according to the amounts of payments made under the Rural Development Program (RDP) 2014-2020.

The existing differentiation in both the development of infrastructure and the economic attractiveness of urban and rural areas was shown. Factors influencing the effectiveness of implementing the concept of sustainable rural development were indicated. Due to changes in the methodology of data collection by Statistics Poland and the lack of statistical data at the lowest level (communes and poviats), many indicators cannot be estimated. However, this issue requires further research and selection of indicators previously used in many studies and possible to be determined for individual areas.

The research carried out on a group of 20 thriving enterprises should be considered as preliminary and further studies should be carried out, taking into account not only large but also medium and small enterprises operating in the studied area. The limitation in presenting precise indicators enabling the monitoring of sustainable transport in selected regions (poviats and communes) is that for many such areas there is currently no statistical data. The available data is collected at the level of voivodships or macroregions. The data such as road network density were available only at the poviat level, making it impossible to precisely assess individual communes.

There are many studies in the literature on the impact of transport infrastructure on the quality of life of city dwellers and the economic development of urban areas, while there is a cognitive gap regarding rural areas. Carrying out such research in areas outside the country's main transport corridors is an attempt to fill this gap and indicate the possibility of further research and the resulting benefits. Policymakers, by strengthening infrastructure and enabling better opportunities for the transport and movement of people and goods, create opportunities for development for society as a whole. A well-developed rural commune attracts new residents and new investments.

In Poland, as in other European Union countries, there are many similar regions with poorly developed road and rail infrastructure. On the basis of such examples, it is possible to plan development that will contribute to the increase of the attractiveness of the region in rural areas remote from the main transport routes and will use the local resources of the region, such as tourism, natural values, cultural capital or innovation.

The study is an attempt to fill the cognitive gap for areas with underdeveloped transport infrastructure. When planning the research, it was noticed that there was a lack of studies covering comprehensive studies of urban areas in terms of

infrastructure, including transport. Most of the publications relate to large and small towns, urban transport and suburban areas. Therefore, an attempt was made to fill this gap using one such area as an example.

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## 1.6 Unfair supply value chains of fair trade commodities (Dariusz PIENKOWSKI<sup>1</sup>)

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**Keywords:** *fair trade movement, supply value chains, ethical consumption, sustainable development*  
**JEL:** Q17, Q01, F12.

Fair trade (FT) is defined as “a trading partnership, based on dialogue, transparency and respect, that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers – especially in the South” [1]. The movement addressing ethical consumption is grounded in conscious support for producers. The higher prices of the products result from the floor pricing at the first stage of the supply chain. The demand for the higher priced FT products is grounded in the ethical attitudes of responsible consumers. A report by BASIC [2] illustrated the bottleneck in the agricultural global market with the following numbers: two and a half billion farmers and workers produce commodities for seven billion final consumers, while on the way to the consumers, the top ten brands account for 15% of world retail sales and only five retailers account for 50% of the market in Europe. The small-scale farmers on the South have to live with incomes of as little as \$0.5 per day [3]. On the contrary, the total pay in 2019 for the chairman and chief executive officer of the largest player on the cocoa market, Mondelez Int., was close to \$50,000 per day [4]. This leads to extreme poverty in the South, as well as many other social and environmental problems such as child labour at the cost of schooling, exploitation of workers, deforestation, extensive production with pesticides, soil degradation, and climate change [5]. The FT movement addresses the problem of the producers in the supply chain.

The research is based on a comparison of margins in different stages of the supply value chains of FT and non-FT commodities. The research does not call in question the higher profits of FT producers but considers the additional profits unrelated to the FT mission mostly generated in the next stages of their supply value chains, including retailers in particular. The hypothesis based on the research is that the stakeholders in the next stages use the ethical attitudes of responsible customers to offer higher prices that do not result from the costs borne in the first stage. As a consequence, the products are available for wealthier customers, while conventional production related to environmental and social problems is demanded by less wealthy customers.

The data are collected from the documents and reports on the agri-food sector, particularly including the cocoa, coffee, banana, and wine industries. For example, the calculations based on the analyses of coffee and banana supply value chains [6] show that the final value for consumers of the FT commodities would increase for coffee and bananas by only 27% and 6%, respectively, compared with the non-FT ones. However, the final price is also strongly influenced by the higher margins in the next stages, which are not directly related to the FT movement. In the example, the final price for 250 g of FT coffee increases by 60% and that for 1 kg of bananas by 22%. As a consequence, the final consumer price increases for the FT commodities are not generated exclusively by the profits of the key beneficiaries of the FT movement.

However, relatively lower retail prices will support development of the South as well as sustainable consumption patterns in the North. The increase in the shares of producers follows the FT mission, while the increases in margins in the next stages are not justified by the policy. The non-FT commodities should be taxed due to the costs typically incurred by the farmers, their communities, and the environment. The North's economic policy should include the real costs of production, regardless of which part of the world generates the costs. Moreover, the small-scale farms operate in market conditions that are much closer to the economic models of perfect market competition, and the policy behind

the minimum price and premium directly addresses the postulates of sustainable development related to poverty, distributive justice, and environmental threats.

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## **1.7 Exploring sustainable aspects regarding the Food Supply Chain, Agri-Food Quality Standards and Global Trade: an empirical study among experts from the EU and the US**

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**Keywords:** *agri-food industry; food safety; global supply chains; sustainable trade; Transatlantic Trade and Investment Partnership (TTIP)*

**JEL:** Q01, Q11, Q17

One of the most important economic sectors of the European Union (EU) is the production and trade of agricultural products and foodstuffs. In this context, increasing globalization and market integration are becoming vitally concerned. As a result, market structures are constantly changing, companies are facing increased competitive pressure, and export volumes are rising significantly, which is reflected in EU trade policy. The global agricultural trade is determined by a complex combination of international regulations and agreements with national laws and requirements. These established regulations aim to ensure the safety of processes and products in the agri-food industry, so that the quality and safety of food is guaranteed worldwide.

Food quality standards are effective along the entire process chain and are an essential tool for ensuring safe, standardized and comparable processes and products in international trade. Consequently, international quality standards are a key element for successful global trade. Nevertheless, they are considered non-tariff barriers to trade. For this reason, there is a risk that certain complications may arise within the global food supply chain (FSC), for instance double certification, no recognition of the product, origin identification, labelling and others.

In the last years, the EU adopted a series of policies and strategies to address the international trade in agri-food products. The most important is the EU's Common Agricultural Policy (CAP), which follows three paths to sustainability: Social sustainability, Environmental sustainability and Economic sustainability. The European Commission's priorities for 2019-2024 include the European Green Deal, of which the Farm-to-Fork Strategy (F2F strategy) is an integral part of the research.



## 1.8 The impact of COVID-19 on foreign trade in agricultural products in Poland

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**Keywords:** Covid-19, trade, meat, cereals

**JEL:** Q17, Q11

The aim of the research was to determine the significance of restrictions introduced during the Covid-19 pandemic on international trade in pork, beef and poultry meat and cereals in Poland. The analysis covers the period from March 2019 to March 2021.

The research analysed changes in exports and imports on a monthly basis comparing export and import volumes to the corresponding month of the previous year. Analyses were conducted in both volume and value terms.

In a long-term perspective, cereal and poultry meat exports are in a strong upward trend, beef exports are also growing, although at a much slower pace, while pork exports have been in a sideways trend since 2012. Pork is also the only one of the analysed products that generates a negative balance (and still growing) in foreign trade. In the case of cereals, imports have been at the level of 400-600 thousand tonnes since 2011. On the other hand, imports of beef and poultry meat are of marginal significance.

Analysis of the data on a monthly basis does not give clear results. The restrictions on movement introduced from March 2020 in a succession of countries and from April onwards did not generally affect the transport of goods, but the fear of the disease reduced the number of drivers willing to travel to regions with high outbreak levels. Disruptions were also due to illnesses and quarantine obligations, which periodically hampered and even paralysed the operations of individual companies.

In the case of pork exports, no major impact of the restrictions was observed. In the period immediately preceding the outbreak of the pandemic, Europe saw the largest year-on-year decline in exports due to the high base. As of July 2020, exports were higher than the previous year by several percent, while in volume terms they were mostly in the 28-35 thousand tonnes range. No significant changes were also noticed in exports to the USA, Vietnam or China and Hong Kong. In the case of pork imports, the impact of restrictions due to the Covid-19 pandemic was minimal, as declines in April and May 2020 did not exceed 15%, while in most other months stock declines did not exceed 5%.

Beef also did not see significant fluctuations in export levels and was slightly higher after the start of the pandemic than in the corresponding month of the previous year. The exception was May 2020, when it was lower by nearly 1/3 and concerned trade to all major recipients of Polish beef.

The reduction in trade in the first months of the pandemic was also evident in the case of poultry meat exports, with the greatest slump occurring in April 2020, when exports, compared to the previous year, decreased by 26%, which, given the more than 50% share of exports in total poultry meat production, meant that nearly 15% of production had to be used on the internal market. Exports fell to most large customers, the exceptions being the Czech Republic and Spain. This led to a fall in chicken and turkey prices to 2010 levels.

In the case of cereals, the key factor was the increase in exports already observed from the second half of 2019, with the highest year-on-year growth in March-May 2020, when exports were 3.5 times higher than a year earlier. Grain imports were also under pressure from growing international trade, but the scale of import growth does not exceed 40%. The exception was April 2020, when imports were at a similar level.

In conclusion, it should be stated that in the initial period of the pandemic, when restrictions in international traffic were introduced, their impact on individual agricultural markets varied, the greatest in the case of poultry meat exports, while no noticeable impact was noted in the case of cereals and pork.

## Chapter II: Application of New Techniques and IT in Agri-Food Supply Chains

### 2.1 New technologies in the distribution of agri-food product.

#### Nuevas tecnologías en la distribución de productos agroalimentarios (Trinidad VÁZQUEZ RUANO<sup>1</sup>)

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**Keywords:** *Distribution, Agri-food products, New Technologies, Electronic commercial communications, Internationalization.*

**JEL:** K2, Q5, O3.

**Abstract:** Information and Communication Technologies have influenced various areas. The social, economic and legal stand out. In the business sphere, the consequences have been important because the virtual market has been created through the Internet network or remote electronic channels. This new way of marketing and distributing products is characterized by the reduction of economic costs, the availability of important information, territorial and temporal limits, and the possibility of reaching the global public. These aspects are essential in the international commercialization of agri-food products, which need to extend their scope of distribution.

But the electronic field faces the insecurity and mistrust of the subjects-users of electronic communication networks. Fundamentally due to the new possibilities of entering into contracts with the service provider and their validity; the insecurity of the execution of electronic transactions and the guarantee of personal data and information.

Starting from this initial premise, and according to the formal limitations, the present work focuses on a deficiency detected in the agri-food sector and it is the adequate legal knowledge of electronic commercial activity. And, in particular, the preliminary stage of the recruitment process, promotion. The essential objective is to make an analysis of the relevant and useful electronic instruments for the commercialization of agri-food products and of the applicable legal regime. The establishment of the electronic space of the entity that sells agri-food products is a key element of internationalization.

The objective of this study and of the applicable regulations is to clarify basic aspects about the distribution of agri-food products and the influence of electronic media. To be efficient and conform to regulatory principles. This will benefit the internationalization of the trade of these products.

In conclusion, the promotion of an adequate use of New Technologies in the business sector of agri-food products will be a driving force for business development and for the evolution of the digital economy. ICTs promote electronic commerce and, also, the increase in the use of devices such as mobiles. This will benefit distribution and new forms of commerce in the sector. The use of channels such as social networks has to be a commercial strategy to promote products and attract and retain customers.

**Resumen:** Las Tecnologías de la Información y de la Comunicación se han implementado en diversos ámbitos, entre los que destaca el social, el económico y el jurídico, siendo el marco empresarial en el que sus consecuencias han adquirido una notable repercusión. Esencialmente, por la aparición del mercado virtual que se lleva a cabo a través de la red de redes Internet o de canales electrónicos a distancia. Esta nueva forma de comercializar y distribuir productos se singulariza no sólo por la reducción de los costes aparejados al tráfico económico, sino también por la disponibilidad de una importante cantidad de información sin que existan barreras territoriales ni temporales que lo acoten y la posibilidad de alcanzar a un público global que, en ocasiones, puede estar determinado. Aspectos esenciales en la comercialización internacional de productos como los agroalimentarios que necesitan extender su ámbito de

distribución. Lo indicado se confronta con la inseguridad y desconfianza de los sujetos que son usuarios de las redes de comunicación electrónica ante las nuevas alternativas habilitadas para poder celebrar contratos interactuando con el prestador del servicio y, en su caso, la validez de los mismos; la inseguridad de la ejecución de las transacciones realizadas por vía electrónica y la desconfianza ante el uso que se hace de los datos e informaciones personales.

Partiendo de esta premisa inicial, y teniendo en cuenta las limitaciones formales establecidas, el presente trabajo trata de abordar una deficiencia detectada en dicho ámbito y que se concreta en el adecuado conocimiento jurídico del desarrollo de la actividad comercial por medios electrónicos y, en particular, en la etapa preliminar del proceso de contratación, la promoción. El objetivo esencial es hacer un análisis de los instrumentos electrónicos más relevantes y útiles para la comercialización de productos agroalimentarios y del régimen jurídico a tener en cuenta. En cuanto que el establecimiento del espacio electrónico de la entidad que los exporta va a ser el pilar básico en la comercialización internacional. Si bien, además, existen otros canales e instrumentos electrónicos que llegan a un público determinado y que hacen posible el fomento de la marca de la empresa, la denominación del producto y de éste en sí mismo.

La pretensión de este estudio y de la normativa aplicable en cada caso es clarificar aspectos básicos en materia de distribución de los productos agroalimentarios y la influencia de los medios electrónicos para que su realización se haga de forma eficiente y adecuada a los principios normativos, lo que en última instancia va a beneficiar a la internacionalización del comercio de dichos productos.

En conclusión, el fomento de una adecuada implementación de las Nuevas Tecnologías en el sector empresarial de productos agroalimentarios va a servir de impulso al desarrollo empresarial y a la evolución de la economía digital. Así, las TIC suponen el fomento del comercio electrónico y, al mismo tiempo, el incremento del uso de dispositivos como los móviles, y ello beneficia la distribución comercial y abre nuevas formas de comercio en dicho sector. A mayor abundamiento, el uso de canales como las redes sociales ha de formar parte de las estrategias comerciales para la promoción de los productos y la captación y fidelización de los clientes.

## **2.2 Digital technologies and transformation of business models: impact on supply chain efficiency**

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**Keywords:** digital transformation, digital technologies, supply chain efficiency, food processing sector

**JEL:** L11, L14, L66

**Purpose** – The primary goal of the current study is to assess the relation between implementation of digital innovations/technologies and the efficiency of the supply chain. Thus, the following research tasks were conducted in support of this goal: identification of digital technologies implementing within the supply chain and assessment of the added value resulting from the application of these technologies.

**Design/methodology/approach** – Two-stage approach was implemented in the study. Stage 1 includes creating of literature review based concept of the innovation process. Stage 2 covers empirical analysis by using of statistical methods based on the systematization of information and data on digital technologies and its benefits in companies across Europe.

**Findings** – After the implementation of digital innovations, the majority of the analyzed enterprises noticed the improvement within areas such as quality assessment (81%), risk assessment and risk management (81%) and cost efficiency (70%). The results of the analysis support the view that the implementation of digital technologies provides benefits to the enterprises, that then lead to efficiency improvement. It was found that most beneficial for companies were the digital innovations from group: (I) transformation of business processes and (II) ICT applications.

**Practical implementations** – The question on benefits from investment in technologies is nowadays in focus of managers and scientists. Very little attention has been paid to the operational impacts of digital business models in relevant supply chain contexts. The research fills this gap by providing knowledge about the added value of digital innovations.

**Originality** – A new approach on digital innovation grouping (based on production factors concept) and assessment was proposed in the research. The data analyzed in the study included over 70 enterprises from 10 European Union countries. The data were collected within the broader EU I-CON project.

## **2.3. The issues of ensuring of safe deliveries of agricultural machinery with regards to maritime transport**

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**Keywords:** *agricultural machinery supply, maritime transport, agrotechnology*

**JEL:** R320, R410, Q160

In recent years in Poland has recorded a large share of agricultural machinery exports to overseas countries, therefore this paper presents the issues of the transport of agricultural machinery, both new and already in operation, from the sender to the recipient, with particular emphasis on maritime transport.

The main aim of the paper is to present the specificity of maritime transport of machinery and transport equipment, including agricultural machinery, as one of the chain link in the whole logistics chain. In addition, the paper also addressed the issues related to the preparation of the machine by the manufacturer for transport, resulting from maritime regulations in order to ensure the safety of transport and delivery of the device undamaged to the recipient.

## Chapter III: Food Losses and Waste in the Agribusiness Sector

### 3.1 Effects of Covid-19 pandemic on food losses and waste in agri-food logistics (*Noureddin DRIOUECH<sup>1</sup>\*, *Erika QUENDLER<sup>2</sup>*, *Hamid el BILALI<sup>3</sup>*)*

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**Keywords:** *Agri-food, Food wastage, Sustainable consumption and production patterns, sustainable food systems, EU-Mediterranean zone.*

**JEL:** D81, O14, O32, Q18

Many aspects of the global economy have changed as a result of the COVID-19 pandemic crisis, including our food system (Ahmed et al., 2020; Béné, 2020; Galanakis, 2020; Rippin et al., 2020; Savary et al., 2020). Indeed, the pandemic affected all the stages of the food chain, from production to consumption, with implications in terms of food losses and waste (FLW). In this context, the present review analyses the effects of the COVID-19 pandemic, as well as consequent containment measures, on the generation of food losses and waste along the food chain with a particular focus on logistics.

FLW are not new to the agri-food industry, as up to one-third of the food produced every year in the world is never eaten or reach consumers' table (FAO, 2011). However, the worsening of the issue of FLW due to the pandemic disruption has spotlighted the flaws and gaps present in the food supply chains. As many food businesses/retailers close or need shift, farmers and food producers are left with more food than they can market and sell. This had resulted in a drastic increase in FLW, all while more and more people are food insecure. The amount of people across the globe experiencing acute hunger could dramatically increase by next coming years (FAO et al., 2020), while agri-food producers and actors deal with massive surpluses. Generally, farmers' biggest buyers are the food service industry, including food processors, restaurants, universities canteens, etc., but COVID-19 social and physical distancing rules and instructions have forced many of these places to scale or shut down their operations. This has put a huge pressure on farmers and food producers. It also calls into question the normal food system functioning under the assumption that the food service industry will be buying the bulk of farmers' goods. COVID-19 radically changed that normal. The economic impact of the pandemic has been sending a record breaking number of people to food banks, but it has been difficult for these big food stores to keep their shelves stocked. Expanded food recovery programs can help bridge the gap between an increase in wasted food and increased need for food security. Such a radical change in the food system required an immediate response, and all the food system players should work together to creatively meet this challenge. This call for transforming the agri-food supply chains to make them future-proof (Mollenkopf et al., 2020), which implies new logistic management models with an increased uptake of digital technologies and services (Niewiadomski, 2020). The entire globe was dreadfully unprepared for the pandemic. But by keeping the gears of the food supply chains moving and actively seeking international cooperation to keep agri-food trade open, countries can prevent food shortages and protect the most vulnerable populations. The pandemic induced disruptions in the agri-food supply chains, logistics and marketing with implications in terms of the generation of FLW. However, the analysis of the scholarly literature shows that the effects of the pandemic on FLW in logistics and transport have been largely overlooked. The COVID-19 pandemic represents a 'stress test' for agri-food logistics and should be seized to make it more sustainable and efficient with the aim to reduce FLW while increasing resilience to future shocks and crises.

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## 3.2 Food losses in the bakery and confectionery industry and their measurement methods

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**Keywords:** *baking and confectionery industry (BCI); bread losses; causes of losses; losses prevention; measurement methods*

**JEL:** O14, O32, Q18

**Purpose.** The studies on the creation of a system of gathering and reporting data and procedures contributing to reducing the rate of food losses require detailed information, among else on the methods of obtaining data while taking into account the specific nature of the agri-food market sectors. The purpose of the article is to review the selected methods of gathering data on food losses on the example of baking and confectionery businesses on the background of methods recommended for individual links of the agri-food chain at the level of EU<sup>1</sup>.

**Methodology / approach.** The study is based on the experiences and own analyses of authors who participated in the first study on losses and wastage in Poland, conducted as a part of a research project "Opracowanie systemu monitorowania marnowanej żywności oraz skutecznego programu racjonalizacji strat żywności i ograniczenia marnotrawstwa żywności (Development of a System for Monitoring Wasted Food and an Efficient Programme of Rationalisation of Food Losses and Limiting Food Wastage)" (Polish acronym PROM) within a strategic programme of scientific research and development efforts financed by NCBiR (National Centre for Research and Development) [nr.Gospostrateg1/385753/1/NCBR/2018] (Goryńska-Goldmann et al. 2021<sup>2</sup>).

**Findings.** Various circumstances apply to measuring the losses of bread products and bakery and confectionery products at the level of processing, and affect the significance of individual methods for monitoring this phenomenon. The complexity of processes in the bakery and confectionery production breeds numerous problems with regard to measuring losses, especially in the methodological, technical, organisational and legal aspects. The quality of results of the studies can be increased by identifying the weak and strong points of certain measurement methods. The mass balance method should be considered the most useful one of all methods applied for the analysis of losses in the bakery and confectionery sector. To accurately determine the level of losses and understand their causes, one should first identify solutions implemented by businesses that aim to limit and manage the losses.

**Research limitations / implications.** The Polish BCI is a valuable example due to high consumption of bread among the Polish and because the processing sector features entities representing various models of functioning and ties to the market (both smaller companies whose ties to the market are not well developed, and industrial bakeries

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<sup>1</sup> ATTACHMENT III A method of accurate measurement of food losses to the Commission Delegated Decision (EU) 2019/3321 final ANNEXES 1 to 4 dated May 03, 2019 supplementing the Directive 2008/98/EC of the European Parliament and of the Council as regards a common methodology and minimum quality requirements for the uniform measurement of levels of food waste (<https://ec.europa.eu/transparency/regdoc/rep/3/2019/PL/C-2019-3211-F1-PL-MAIN-PART-1.PDF> ; access: 28.05.2021).

<sup>2</sup> Goryńska-Goldmann E, Gazdecki M, Rejman K, Kobus-Cisowska J, Łaba S, Łaba R. How to Prevent Bread Losses in the Baking and Confectionery Industry? —Measurement, Causes, Management and Prevention. *Agriculture*. 2021; 11(1):19. <https://doi.org/10.3390/agriculture11010019>.



maintaining strong connections to other market players). The results of this study may be used for analyses conducted in other countries, with more homogeneous models of functioning of the industry.

**Originality/value.** Although studies on food losses and wastage are conducted in many countries, only a small portion of the research efforts are concentrated on the BCI. Moreover, there are only a few papers that would identify the usefulness of methods recommended in this regard. This paper contributes to reducing this research gap.

**Conclusions.** To a large extent, the incomplete measurements of losses in the industry result from limitations in accessing the data. Businesses are reluctant to disclose any information on food losses. Obtaining materials for calculations that would allow to identify and determine the level of losses of bread products and of bakery and confectionery products is a labour-intensive and time-consuming process of gathering data in a meticulous way, followed by selection and verification of unprocessed material. The mass balance method has been determined to be of high application value. It is also possible to integrate the mass balance method with the direct measurement of losses. The survey (questionnaire) method was determined to be less recommended. However, these methods gain value if supported with qualitative study results (such as interviews, the Delphi method). Combining the quantitative and qualitative approaches proves a very valuable source of information for those wishing to understand the mechanisms behind losses and to create a mechanism for combating them.

### 3.3 Prevention of bread losses and waste in the baking and confectionery sectors

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**Keywords:** *baking and confectionery industry (BCI); bread losses; causes of losses; losses prevention; measurement methods*

**JEL:** O14, O32, Q18

**Purpose.** The reduction of food losses and wastage is an urgent challenge in the efforts to increase the sustainability of food systems, allowing a better use of arable land, water, energy and other means of production, but also to reduce the emission of greenhouse gases and improve human health. The manufacturers of bread products and of bakery and confectionery products share responsibility for preventing food wastage. To fill the knowledge gaps related to the inefficient production system in the baking and confectionery industry (BCI), research was conducted to estimate the scale of losses in BCI in Poland, determine their causes and assess the risk of their occurrence, identify retrieve points (RP) and ways of reducing and preventing losses.

**Methodology / approach.** There is no approved system of monitoring of the actual quantity of losses and wastage of food in the agri-food sector in Poland that would provide sufficient information about the level and causes of this phenomenon in particular sectors and their links (among else processing, transport, warehousing, retail and households). The study is based on quantitative and qualitative studies results and on the experiences and own analyses of authors who participated in the first study on losses and wastage in Poland, a part of the research project "Opracowanie systemu monitorowania marnowanej żywności oraz skutecznego programu racjonalizacji strat żywności i ograniczenia marnotrawstwa żywności (Development of a System for Monitoring Wasted Food and an Efficient Programme of Rationalisation of Food Losses and Limiting Food Wastage)" (Polish acronym PROM) within a strategic programme of scientific research and development efforts financed by NCBiR (National Centre for Research and Development) [nr.Gospostrateg1/385753/1/NCBR/2018] (Goryńska-Goldmann et al. 2021<sup>3</sup>).

**Findings.** The total scale of losses in Polish BCI reached 2.39% (in 2017) and 2.63% (in 2018) of the weight of manufactured products. The loss analysis was presented within respective sections of production: raw materials magazine, production section, final product magazine, final product transport. The highest loss level was reported for the production section — 1.56% (2017), 1.85% (2018). Additionally, 12 loss risks and 9 main cause categories were identified. Potential 6 RP during the baking processes were indicated: making and handling intermediate products and dough; portioning and forming of dough, baking, customised packing, shipping (storage), transport by own fleet. The type of risk, the cause of losses, their consequences and manners of preventing losses were specified for each RP. Being the first study of this kind in Poland, its results are key to building a road map for further research focused on reduction of food losses, more sustainable management of resources in BCI. It might contribute to corporate social responsibility and value co-creation.

**Research limitations / implications.** In the future, the studies on losses in the processing area of the BCI should account for the volume of losses generated by returning the bread from retailers to the producers and suppliers.

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<sup>3</sup> Goryńska-Goldmann E, Gazdecki M, Rejman K, Kobus-Cisowska J, Łaba S, Łaba R. How to Prevent Bread Losses in the Baking and Confectionery Industry? —Measurement, Causes, Management and Prevention. *Agriculture*. 2021; 11(1):19. <https://doi.org/10.3390/agriculture11010019>.

Limiting the losses in the industry due to this reason should be considered one of the most pressing problems to be solved when taking actions to limit losses in the baking and confectionery industry.

**Originality/value.** Food wastage studies have been extensively discussed in academic papers, with their leading issues analysed in relation to entire, basic food groups. There are far fewer papers on the issue of estimating food losses or waste for individual food commodity groups, including the BCI. This study contributes to reducing the existing research gap.

**Conclusions.** The obtained results are of key importance for pursuing further research and show premises for developing road maps leading to the reduction of food losses in the BCI. The business solutions implemented in the sector's enterprises should be rooted in the principles of corporate social responsibility and creating common value, where loss limitation is taken into account. The presented research results should be used to develop programmes and recommendations to prevent and manage food losses in the BCI, which is determined by environmental, economic and socio-ethical issues.

## Chapter IV: Agri-Food Clusters and their Linkage with the Development of Innovation and Sustainability Principles

### 4.1 Italian agri-food clusters: concept and national model of food innovation (*Noureddin DRIOUECH<sup>1\*</sup>, Suzana MAZDARIC<sup>2</sup>, Lamberto LAMBERTI<sup>3</sup>, Francesca VOLPE<sup>4</sup>*)

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**Key words:** *business model, logic of management, meat supply chain, customer value added*  
**JEL:** L26, O1, O3

**Introduction/Background:** Clusters are of growing importance in the new global environment in which the Europe 2020 strategy has to succeed. The EU Commission (EC, 2008) defines clusters as “groupings of independent undertakings - innovative start-ups, small, medium and large undertakings as well as research organisations - operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of knowledge and expertise and by contributing effectively to technology transfer, networking and information dissemination among the undertakings in the cluster”, or in a very simplified version as “groups of specialized enterprises, often SMEs, and other related supporting actors in a location that cooperate closely”. Currently there are around 3000 specialised clusters in Europe, accounting for around 54 million jobs. Cluster collaboration at the European level and beyond is supported by the European Cluster Collaboration Platform (ECCP), connecting more than 1,000 cluster organisations for the total outreach of 100,000 Small and Medium Enterprises (SMEs), around 8,000 large companies and 11,000 Universities and other research organisations (EC, 2020). Italy, is one of the EU countries with the highest number of clusters organisations, together with France, Germany, etc. Italy is considered as one of the pioneers in cluster formation and creation of cluster policies, with its concept of “Industrial district”. In general, Italian industrial clusters are considered as one of the pillars of the national economy, contributing with 30% to total national manufacturing exports and gathering mostly SMEs rather than larger companies. They are particularly important for the traditional sectors, such as textiles, furniture, footwear, etc.. This high presence of cluster and networking organizations in Italy is also considered as important strength to adapt to the competition coming from the emerging economies OECD (2014). The present work is an ongoing research and effort under the UniClaD project. UniClaD project is aiming to enhance capacity of universities to initiate and to participate in clusters development on innovation and sustainability principles”.

**Methods:** A systemic review were carried out in April-June 2020 web-researches using search query (Food OR Agri\*) AND (Clusters OR Distretti) AND (Italy OR Apulia). Issues addressed in the systematic review include research on agri-food cluster at Italian National and regional levels as well thematic focus (agricultural, food processing and rural development). In addition, the present paper is gathered from recent work on the UniClaD EU Program Erasmus+ KA2 project.

**Results:** Clusters are of growing importance in the new global environment in which the Europe 2020 strategy has to succeed. European policymakers cannot afford to ignore their role and should actively explore their potential to modernise and improve economic policies” (EOCIC, 2019). Clusters cannot be understood as fitting into the narrow sectoral view that most industrial policies have, but should be considered as regional ecosystems of related industries and competences featuring a broad array of inter-industry interdependencies. They are defined as groups of firms,

related economic actors, and institutions that are located near each other and have reached a sufficient scale to develop specialized expertise, services, resources, suppliers and skills. Clusters are referred to both as a concept and a real economic phenomenon, such as the Silicon Valley, the effects of which, such as employment concentration, can be measured – as is done by the cluster mapping of the European Cluster Observatory.

### **The Italy National & Regional Agri-food Clusters model National Technology**

Considering in general legislation, the first measure giving an institutional framework for Policy-making targeting regional clusters in Italy was the Law 317 which was approved on 25 September 1991. This law brought new focus, with shift from large companies to SMEs, and it was innovative in terms of concept with industrial district model. In 1999, a new national law on industrial clusters (140/99) was enacted, simplifying procedures and giving more power to the regions to develop their own strategies based on criteria that follow the national criteria but with some flexibility. Further, important step to support clusters development was establishment of the creation of an Agency for the diffusion of technologies for innovation (Agenzia per la diffusione delle tecnologie per l'innovazione) in 2006 (OECD, 2007).

The Agrifood Cluster CL.A.N, established on October 2, 2013 as an unrecognized association (coordinated by Federalimentare Servizi and Aster Emilia Romagna), is a multi-stakeholder network of the key national players of the entire agrifood chain - a partnership of companies, research centres and institutions set up to promote sustainable economic growth, based on research and innovation in the industry and acting as partner for Italian and European Institutions ( <https://www.clusteragrifood.it/en/> )

It was promoted by MIUR in 2012 in order to generate permanent dialogue platforms between the public research system and businesses, consistent with the priorities of the European Horizon 2020 program.

Today CL.A.N represents intermediate infrastructures which are entrusted with the tasks of:

- to foster the cooperation of public / private research on innovation and technological development;
- rebuild national policies in sectors of strategic interest;
- favor the intelligent specialization of the territories.

The CL.A.N. National cluster identifies 3 thrust engines for agri-food innovation

- improving health, wellbeing and longevity
- strengthen the consumer's confidence towards the food supply chain
- promote sustainable and competitive food production

CL.A.N. is the evolution of an important path shared by the main national actors in the entire agri-food chain, in scientific and industrial research, production activities and local institutions of suitable areas, started in the early 2000s. It gathers many leading companies and research institutes of excellence, supporting the sectors in different aspects of national interest, as nutrition, food security, food safety, sustainability, quality etc. Among their activities a special emphasis is placed on product and process innovations, while respecting and preserving the tradition and cultural values. Among the members it has more than 44 enterprises, 48 academic and research institutions, and different institutions from 14 Italian regions (**INVITALIA , 2017**).

**Conclusions:** Agri-food clusters are the only control room for research and innovation in the agri-food sector to suggest to the Ministries of higher agriculture and to the other competent national and regional institutions the sector's R&I priorities and the related investment needs in research and training. Furthermore, they are a collaborative and

inclusive environment that favors synergies between Industry and Research in the agri-food sector and the development of project partnerships.

Finally as they are an opportunity multiplier, they could provides companies/enterprises with the concrete possibility of establishing a permanent relationship with the best national skills in the field of agri-food research.

It can be concluded that European policymakers cannot afford to ignore their role and should actively explore their potential to modernise and improve economic policies in agriculture and agri-industry sectors.

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## **4.2 Academia led open innovation in the food industry - a case study of the EIT Food RIS Consumer Engagement Labs project.** *(Anna WIELICKA-REGULSKA<sup>1</sup>, Elżbieta GORYŃSKA-GOLDMANN<sup>2</sup>, Michał GAZDECKI<sup>3</sup>, Paulina Luiza WIZA<sup>4</sup>)*

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**Keywords:** *open innovation, co-creation, food industry, university, quadruple helix*

**JEL:** O30, O31, O36.

**Purpose:** The paper aims at understanding barriers and opportunities in open innovation systems orchestrated by a university in the food industry. The relevant theory linked to open innovation and the quadruple helix model is described with a focus on the role of academic partners and their relationships with other stakeholders in the value creation network. In the empirical part, we present the case of the EIT Food RIS Consumer Engagement Labs project showing how the open innovation ecosystem was created and maintained.

**Methodology/approach:** To detect barriers and opportunities linked to the creation of open innovation ecosystems by universities we conducted an extended literature study on open innovation at universities and then using a theoretical framework we described the implementation of the EIT Food RIS Consumer Engagement Labs project that was intended to give rise to sustainable, open, networked cooperation between universities, companies, consumers and other stakeholders.

**Findings:** The results indicate that university can play a central role in orchestrating innovation and making it more market-oriented and adapted to changing needs of society. University can also pave a way for some approaches like RRI and co-creation, crowdsourcing and for other tools that have not been widely used by companies yet but allow the stakeholders for better integrity with the knowledge creation network.

**Research limitations/implications:** Universities can play a crucial role in creating and maintaining innovation ecosystems. Networked nature of innovation positions universities as public, neutral, innovation-centric players. The role of the universities in open innovation should be supported both by assessment methods and funding algorithms. Even in low tech industries an open innovation ecosystem can appear and thrive.

**Originality/value:** Paper provides a consistent set of insights regarding the role of the university in open innovation, barriers and opportunities for universities connected to the implementation of open innovation ecosystems in the food industry. The main objective of the empirical part is to show how the ecosystem for open innovation can be created and maintained by the university partners in a low tech industry.

**Acknowledgement.** *The paper describes selected results of the EIT Food RIS Consumer Engagement Labs, a project that has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020 and Horizon Europe, the EU Framework Programme for Research and Innovation.*

### 4.3. Innovation and Sustainability Efforts of the Austrian Food Clusters (Klaus WAGNER<sup>1</sup>, Sigrid EGARTNER<sup>2</sup>, Georg WIESINGER<sup>3</sup>)

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**Keywords:** *Food Cluster, Austria, Innovation, Sustainability*

**JEL:** O14, O32, Q01

**Introduction:** In the frame of the ERASMUS+ project UniClaD (Enhancing capacity of universities to initiate and to participate in clusters development on innovation and sustainability principles), cluster examples in various EU countries are analysed to get a good information basis to foster cluster development in Azerbaijan, Moldavia and Ukraine. In the Austrian case, we observe a very diverse range of clusters in the agri food sector. For example, clusters concern technical topics like the Machinery Ring or Technopol Wieselburg, food topics like food clusters in Upper and Lower Austria, the Network Kulinarik or rural development oriented topics like Holidays on the Farm, Green Care or Nature Education. The clusters vary very much in their organisation structures, objectives, number and types of members and their horizontal or vertical strategic focus (Wagner et al., 2020).

**Methods:** The information of this paper is gathered from recent work on the UniClaD project and web-researches. For gaining deeper quantitative and qualitative information a guideline for in-depth narrative interviews of cluster-managers has been developed and applied in an interview with the cluster manager of the Food Clusters Upper and Lower Austria. The results will be shown in the conference presentation

**Results:** The Food Clusters of Lower Austria (<https://www.ecoplus.at/interested-in/clusters-technopols/clusters-in-lower-austria/food-cluster-of-lower-austria/>) and Upper Austria (<https://www.lebensmittel-cluster.at/en/>) have been established as a network of the food industry.

The objectives are

- to provide information for its members,
- to foster networking, support participating in cooperation projects,
- act as a service and contact point for the entire value chain of the food industry in Lower and Upper Austria,
- to foster sustainable use of resources,
- to facilitate the development of new products,
- to care for food quality and safety.

The clusters have a regional scope but participate also in national and international cooperation projects. Currently together they comprise more than 300 members with a thematic range from agricultural enterprises, research, development and educational institutes (schools and higher education institutes), food retailers and wholesalers, restaurants, food processing SMEs and industries, SMES and industries producing machinery, packaging materials, detergents, pesticides. The strategic alignment is both, vertical and horizontal. The clusters are operating via business agencies, financed by membership fees and public money, inter alia from EU funds.

**Conclusions:** The cluster activities focus on innovation to care for sustainable use and re-use of resources (water, energy, soil) and by-products and to reduce waste, also to develop new products and to guarantee food quality and safety. The clusters are engaged in various cooperation projects, among them in the European Innovation Partnership (EIP) where they try to identify issues for the development of innovative, cooperative and sustainable solutions. Current initiatives support companies very strongly in digitalization projects, see <https://www.ecoplus.at/interested-in/clusters-technopols/clusters-in-lower-austria/food-cluster-of-lower-austria/focus-topic-sustainable-use-of-resources/> and <https://www.lebensmittel-cluster.at/themenschwerpunkte/neue-technologien-und-innovationen/>.

**References:** Wagner, K., et al. (2020) Cluster Examples Austria. Presentation at the internal UniClaD Online Meeting 12.6.2020.



## **4.4. The role of clusters in improving the functioning of the agri-food value chain**

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**Keywords:** *clusters, food supply chain, value chain, agri-food sector*

**JEL:** K49, Q13, Q18.

The purpose of this research is to identify the role of clusters in improving value chain performance in the agri-food sector. In particular, the aim is to identify the legal determinants of its development. It also allows the analysis of the proposed legal solutions in terms of the CAP 2021-2027.

The research is based on a dogmatic analysis of normative texts, a historical and a descriptive method. The paper is based on the survey of legislations, legislative documents accompanying their creation, and professional articles and publications of experts focusing on the role and functioning of clusters in agriculture.

The choice of the discussed topic is justified by many reasons, including cognitive and socio-economic. Namely, clusters, despite the lack of a specific legal structure, are used in the agri-food chain. To a large extent, as practice shows, they are formed as an "entity" through which participants can obtain certain funds for business development. At the same time, they are constantly undergoing a certain evolution, which corresponds both to the adopted directions of successive agricultural reforms and to the adaptation and regulation possibilities in particular Member States. On the other hand, in terms of socio-economic considerations, the functioning of clusters is conducive to the planning of agricultural activities and to projecting a certain income.

The issues raised in the article are not new, no less they are current. They have already been discussed from the perspective of various fields, such as economics or management. Most often in the literature in this area, the authors analyze some economic mechanisms for the separation of individual clusters or issues of profitability of their activities. Legal issues have received less attention.

The important role of clusters has been recognized by the legislator in the drafted CAP. Undoubtedly, despite the regulatory looseness, clusters strengthen the value chain in the agri-food sector. This value can be considered in terms of utility, and it manifests itself, among other things, in the concentration of competing entities in a given region, their specific specialization, as well as strengthening cooperation horizontally and vertically.

## Chapter V: Legal Determinants of the Functioning of Agri-Food Supply Chains

### 5.1 Activities of agricultural producers' associations in ensuring food safety and security – selected legal and economic issues (Aneta SUCHOŃ<sup>1</sup>)

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**Keywords:** *food security and food safety, agricultural markets, agricultural producer organizations, groups of agricultural producers, food waste*

**JEL:** K12, Q18, Q13, P13

For several years now, the issue of food safety and security has been growing in importance since it is necessary to provide consumers with appropriate quality and quantity of food. The issue is becoming particularly significant in the times of COVID 19, when, on the one hand, there is a problem with exports and imports, which may result in a temporary shortage of some agricultural products. On the other hand, due to the pandemic, more attention is being paid to food of appropriate quality that can provide all essential nutrients.

Agricultural producer associations, such as agricultural producer organizations or groups, are important entities in the food supply chain. In the middle of 2017, there were 3434 agricultural producer organizations and 71 associations operating in the EU, 50% of which were in the form of cooperatives. A total of 633 producer organizations and 25 associations of recognized producer organizations operated in France in all sectors at the beginning of 2020. As early as in 2012, there were 904 agricultural producer organizations in Germany (European Commission, *Study of the best ways for producer organisations to be formed, carry out their activities and be supported*; 2019, [online]. European Commission website [access: 2020-05-30]. Available online: <[http://real.mtak.hu/105490/1/report-producer-organisations-study\\_en.pdf](http://real.mtak.hu/105490/1/report-producer-organisations-study_en.pdf)>).

The aim of the paper is to attempt to determine whether and to what extent the legal regulations concerning the association of agricultural producers incentivize these entities to take actions to ensure food safety and security. In the first place, considerations focus on the concept of food security. For that purpose, a literature review was made and some legal regulations were referred to. Food safety refers to all necessary actions that need to be taken during all stages of the food production and trading process in order to ensure the safety of life and health of the consumers (*White Paper on food safety*, [online]. <https://eur-lex.europa.eu/legalcontent/EN/TXT/HTML/?uri=LEGISSUM%3A132041&from=EN>). The basic research method involved the dogmatic analysis of normative texts, which is a characteristic feature of a lawyer's work. In the first place, the legislative acts concerning agricultural law and food law were examined.

The article focuses on agricultural producer organizations as a fundamental instrument for the development of agricultural markets. The wide range of activities of agricultural producer organizations resulting from the EU legislation was indicated. According to Article 152 of Regulation (EU) No 1308/2013 of the European Parliament and of the Council, they conduct e.g. joint processing, distribution, including joint selling platforms or joint transportation; joint packaging, labelling or promotion; joint organising of quality control; joint use of equipment or storage facilities. To ensure food safety, every stage of the activity, including the primary activity, is important. The food law covers primary agricultural activity that has an impact on the quality assurance of agricultural products. It is the agricultural producer that, depending on the type of crop, the amount of fertilizers and plant protection products used, affects food safety. Also, the rules governing the cultivation of agricultural products are particularly important for the organizations and groups of agricultural producers. They ensure that products produced on various farms are of the same quality. The next stage, i.e. transportation and storage of products, is also important in terms of food safety.

It should also be emphasized that some of the agricultural producer organizations also deal with processing. Then, the agricultural products supplied by the cooperatives are processed and marketed. Organizations and groups

can prevent food waste, for example by having adequate storage system and storage facilities and they can market the food when needed. The article presents selected legal regulations concerning the functioning of groups and organizations of agricultural producers.

In the summary, the author states, inter alia, that legal regulations concerning groups and organizations of agricultural producers incentivize, and sometimes even oblige, associations of agricultural producers to take actions contributing to food safety. In Poland, it is necessary to change the regulations to incentivize agricultural producers to associate in the form of organizations more than in the form of groups of agricultural producers.

## 5.2 Liability deriving from non-compliance with the ods associated with agriculture

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**Key words:** *SDGs, agriculture, liability, risk, GAP*

**JEL:** Q15, Q18, K32

Our starting hypothesis, we begin by stating that the agent in the chain that suffers the most restrictions and conditioning factors in the exercise of their economic activity is the farmer. Hypothesis that we intend to confirm in our final conclusions through the study of the new CAP 2021/2027, the SDGs and the United Nations Decade that develops interventionist strategic lines that we consider affect the rights and obligations of the different agents in the chain, which are not always equally distributed in the application of the rules.

There are many regulations involved in the implementation of the 2030 SDGs (Sustainable Development Goals) and the new Action Plan for the Circular Economy (European Parliament Resolution of 2021), which we believe cannot serve to restrict the personal freedom of producers in relation with other agents involved in the food chain up to the consumer.

When we briefly analyse the European and national regulatory framework, the objective of preserving specific natural resources such as water or soil, or the environment in general, seems to fall disproportionately on the obligations of the producer (Cazorla and Millán, 2019), when in reality it is a question of protecting a common good, called by some Our Common Home, (Gómez, 2020) where responsibility is shared within and outside the food chain, both from the public and private sectors.

The quality of agricultural soil in Europe has suffered a deterioration that can be seen in processes of erosion, loss of organic matter and biodiversity, or salinization as can be seen in the Mediterranean area, which makes the different agro-systems more vulnerable (Xiloyannis et al., 2018); as well as water quality, which must be conserved to prevent the consumption of inputs (fertilisers, herbicides, etc.) and the performance of the different activities necessary for production (tillage, pruning, sowing, etc.) from being reduced if sustainable practices are not carried out (Aznar, Velasco, López and Del Moral, 2020). Similarly, Román, González and Gil, (2016) advocate the application of good agricultural practices focused on conservation agriculture and soil management, which affects water quality control.

Under the objectives of sustainable development, related processes are established such as the UN Decade for Action "Water for Sustainable Development" (2018-2028) and the UN Decade on Ecosystem Restoration (2021-2030), joins the European farming family, which takes centre stage as a reference in the UN Decade of Family Farming (2019-2028) for countries to develop public policies and investments to support family farming and contribute to the achievement of the SDGs.

The farmer and the farming family are at the heart of conservation agriculture, both individually and as part of producer organizations or agricultural associations, who do not lose direct contact with their environment and the place where they live, and whose main interest is to preserve their livelihood. We refer to legally recognised legal entities where the producer is the one who manages and organises production in compliance with their statutes (Cazorla, 2019). For this reason, family farming is essential for the achievement of several of the SDGs and several of the actions of the United Nations Decade, for which it is necessary to empower agricultural professionals and therefore the rural populations that make up the Europe of the regions.

We believe that the empowerment of the productive sector and rural communities in Europe will not be achieved through active policies alone, because it will be achieved from different perspectives (legal, strategic, educational, etc.), but it is probably the economic route that, together with the social one, will underpin all the others. The current pandemic has led us to many restrictions, but the European consumer has been supplied at all times, because our farmers have allowed with their effort and work the supply of fresh products, so that the consumer could buy them, although the benefits derived from the price increase have not reached them (Esbry, 2020).

Poznań, Poland, June 23-24, 2021

When this price increase paid by the consumer is not passed on to the producer, it is clear that there is a malfunction in the food chain. But this asymmetry is not the only one, when agricultural policies aimed at improving the social and economic recognition of producers only result in economic aid that contributes to a continuity and subsidised agriculture that bears the burden of maintaining ecosystems and the quality of soil and water, as if they were the only beneficiaries of economic activity and the only ones responsible for agricultural practices.

The risks generated by agricultural activity, the use and management of residues, crop residues, soil management, production and use of fertilisers and phytosanitary products, water management, pruning, and so on, are the responsibility of different professionals and not only of producers.

### **5.3. The country of origin or place of origin in the agri-food products labelling from polish perspective**

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**Key words:** *Food Law, labelling food, country of origin*

**JEL:** Q17, Q21, Q18

The aim of the paper is to answer the question whether the applicable regulations provide reliable information about the country of origin of the products? In the jurisprudence of Polish courts and the EU Tribunal, it can be seen that the EU regulation raises interpretation doubts.

Ensuring a high level of consumer health protection and the right to information about food requires appropriate legal instruments. Adequate food information enables an informed choice of health, social and environmental products. The role of the legislation should therefore be to establish an effective prohibition of misleading both in terms of the formulation of food information and its presentation, in any form (including in advertising). The prohibition of misleading correlates with the right to reliable information about food, which is closely related to product safety.

The place of origin, in the light of Regulation UE No 1169/2011, is the place from which, according to the information provided, a given food originates, which does not constitute the "country of origin", and the name, business name or address of the food business operator on the label does not constitute a country or the place of provenance of the food (Article 2 (2) (g)).

From April 1, 2020, the rule has become that the country or place of origin of the primary ingredient, which differs from the indicated country or place of provenance of a given food, is given as a reference to one of those indicated in Art. 2 lit. a of Regulation 2018/775 of the geographical area or by the following statement: "the name of the primary ingredient) does not come / do not come from (country or place of provenance of the food)" or using other similar wording with the same meaning for the consumer (Article 2 letter b). Information on origin shall be presented using a font size not less than the minimum font size required by Art. 13 sec. 2 of Regulation (EU) No 1169/2011.

In the most important case, the Court of Justice ( C-485/18, ECLI:EU:C:2020:763; Groupe Lactalis / Premier ministre) stated that Art. 26 of Regulation No 1169/2011 does not prevent Member States from adopting provisions requiring additional mandatory particulars pursuant to Art. 39 of the said Regulation, provided that these provisions are consistent with the purpose intended by the EU legislator and form a coherent whole with the product designation. Thus, the provisions of EU law harmonizing the compulsory indication of the country of origin or place of provenance of food products, and in particular milk (as this was the case in the aforementioned CJ ruling), do not prevent the adoption of national provisions requiring certain additional information on origin. However, according to the Court, it must first be examined whether there is a proven link between certain characteristics of the food and its origin and, moreover, whether the majority of consumers attach considerable importance to that information (Article 39 of Regulation No 1169/2011). Consequently, the assessment of the existence of a proven link cannot be based solely on subjective elements relating to the meaning of a link which most consumers may perceive between certain characteristics of the food and its origin. Adoption of such regulations by Member States requires proof of a proven link between certain features of a foodstuff and its origin.

Poland has specific national regulations that fulfill the regulatory possibilities provided for by EU law. The interpretation of some legal acts regarding the indication of the place of origin of products is difficult (for example, concerning hunting or fishing products). Some interpretation problems were also resolved in the practice of applying the law, as evidenced by the jurisprudence of Polish administrative courts.

However, if the country or place of origin of a given food is given and it is not the same as the country or place of provenance of its primary ingredient, then the country of origin or place of provenance of this primary ingredient is also given, or it is indicated that the country or place of provenance of this primary ingredient is different from the country or place of provenance of the food (Article 26 (3) (a), (b)). These issues were considered in the jurisprudence of administrative courts in Poland. In one case, the Provincial Administrative Court did not consider that the adjective "Polish" indicated the country of origin of the product. It was a term used in the name of vegetable fat.

The use of a trademark was also considered as a misleading product designation. A trademark is part of the product designation and is subject to the related rigors. It is assessed for the entire assay. Part of the designation of the questioned products, ie "Old Polish cuisine", may mislead potential customers as to the composition or (and) methods of production (production) of the disputed agri-food product. This name created, according to the Provincial Administrative Court in Warsaw, a misconception about the product, and in a situation where it is the first and leading element of information, it should also be considered obvious that, at the same time, it has an impact on the possibility of making a fully rational decision.

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## 5.4. Synergies between the EU public and private sectors in reducing food waste

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**Keywords:** *European Green Agreement, food waste, France, Finland, Slovakia*

**JEL:** K32, Q5

The European Green Agreement provides an opportunity to reconcile the environmentally friendly use of EU food. Fulfilling this strategy necessitates the participation of both the public and private sectors at all levels of government along the food value chain. The paper focuses primarily on EU legislation with the goal of Reduce food waste per capita at the retail and consumer levels by half by 2030. A proposal for a revision of EU rules by date labeling ("use by" and "date of minimum durability") is set for 2022. We achieved the set purpose by use of analytical methods of the EU and national legislation in selected EU states. Some EU Member States have already fulfilled this commitment, for example, Slovakia by the Food Act no. 152/1995 Coll., effective from 01.01.2017 in § 6 par. 7 established: After the date of minimum durability, only if it is safe, the operator may transfer the food free of charge to a person performing a public benefit activity in the field of providing social assistance free of charge. Public and private entities assist operators in meeting the requirements of EC Regulation 852/2004 concerning the dispensing of such foods. Other countries, such as Finland, recognize The Food Act (23/2006, including amendments up to 352/2011) as a codex for safe food handling. Evira Finnish Food Authority Instructions 16035/1 – In accordance with Decree 1367/2011 agrees that some foods may still be sold or donated after the “best before their expiration date.” For these specific items, the quality of the food is linked to how long its freshness lasts after it has been donated. Food cannot be thrown away in a landfill. If it is not donated, it must be transported in a waste disposal site. In Finland, efforts are being made to increase food waste and loss monitoring and reduction. The tools have been customized for each stage of the food chain. France, on the other hand, has established legislative frameworks aimed at preventing food waste. Law No. 2016/138, enacted on February 11, 2016, requires supermarkets to enter into an agreement with non-profit organizations to donate food that would otherwise be wasted; however, the proportion of food to be donated has not been established. This law imposes fines on business operators who make safe food inedible on purpose. Our analysis of legislation concerning food waste shows that EU successfully coordinates the legislation of EU member states to achieve the food waste reduction.



## 5.5. Legal regulation of food products supply to market in Lithuania (Jolanta VILKEVIČIŪTĖ<sup>1</sup>, Jan ŽUKOVSKIS<sup>2</sup>)

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**Keywords:** *legal regulation, food products supply*

**JEL:** K15, M21

The development of short food supply chains is encouraged in the European Union and Lithuania, and the main goal is to ensure that quality agricultural products reach the final consumer as soon as possible. Therefore, short food supply chains enable consumers to get healthier, more valuable food without having to pay extra to the intermediary when buying.

Thus, short food supply chains benefit both local producers and consumers. However, to supply food to consumers, it is also necessary to know the legal framework governing food supply, food safety, public procurement rules and other legal nuances.

**The aim of the research:** after analyzing the legal regulation of food supply, food safety, public procurement rules and state incentives in Lithuania, to provide scientific insights related to food supply, food safety in Lithuania.

**Methodology of research:** analysis and synthesis of Lithuanian and foreign authors scientific literature, legal acts, best practices in short food supply chains in Lithuania, content analysis, systematization of data.

**Results:** The main legal acts regulating the provision of food supply, food safety, public procurement rules are the following: Civil Code of the Republic of Lithuania (2000); Law on Consumer Protection of the Republic of Lithuania (2007); Law on Product Safety of the Republic of Lithuania (2001); Law of the Republic of Lithuania on Rights of Patients and Compensation of the Damage to their Health (2009); Law on Advertising of the Republic of Lithuania (2002); Law on Food of the Republic of Lithuania (2000); Law on Public Procurement law (1996) and e.c.t.

The Law on Food of the Republic of Lithuania (2000) establishes the requirements for food placed on the market and its handling, the competence of state institutions and public consumer protection organizations in ensuring food safety, as well as regulates the duties and responsibilities of food handlers and producers and suppliers of food contact products. The provisions of this law are in line with the legal acts of the European Union. Only the food, products and materials in contact with food that meet the safety, quality and handling requirements established in the Law on Food of the Republic of Lithuania and other legal acts must be placed on the market.

State food control covers all stages of food handling, from the cultivation of food plants and animals to the provision of food to consumers, including the market. The State Food and Veterinary Service, when monitoring compliance with the requirements of legal acts, has the right to: to check the hygiene condition of the food handling place and food handling processes; to check how persons who, in the performance of their duties, come into direct or indirect contact with food comply with the requirements of hygiene (without prejudice to the principles of medical ethics); inspect food, its labelling, products and materials in contact with food, tools, materials and equipment used for food handling, cleaning and repair of premises and equipment, etc. (Article 11 of the Law on Food of the Republic of Lithuania).

The product presented and placed on the market must be safe (Article 4 of the Law on Product Safety of the Republic of Lithuania). A product is presumed safe when it complies with the voluntary harmonized standards, the references

of which have been published in the Official Journal of the European Union, and the requirements set out in the technical specifications of the products.

**Conclusions:** Lithuania has an enough legal framework in place to ensure that only safe food reaches the consumer.

It also identified the need for additional legal education for agricultural producers in the areas of food safety and public procurement

## **5.6. The issue of preparing containers for the safe carriage of agricultural products by maritime transport** (Małgorzata SZYSZKO<sup>1</sup>)

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**Keywords:** *agricultural products export, containers, maritime transport, agricultural supply chain management*  
**JEL:** Q170, R410, Q130

In recent years, it has been noted that more and more agricultural products, both imported and exported, from overseas areas are transported in containers by maritime transport, therefore this article discusses the issue of transporting agricultural products in containers .

The aim of this paper is to present of results of many years research covering such areas as: identification of threats that can occur during transport resulting of cargo properties and the specificity of maritime transport, as well as a review of the current requirements defined by national and international regulations. The paper presents the necessary principles and requirements for the process of preparing a container for the transport of agricultural products by the loader.

## Chapter VI: Corporate Social Responsibility in the Agri-Food System

### 6.1 Agribusiness as an attractive place to work a gender perspective (Magdalena KOZERA-KOWALSKA<sup>1</sup>, Jarosław UGLIS<sup>2</sup>)

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**Keywords:** *agribusiness; agriculture; gender perspective of work; Generation Z view of work*  
**JEL:** A23, J16, O34, Q13

Agribusiness is both a complex social process and a market structure, consisting of many independent economic entities that generate demand for labour in the sector. The role of people whose activity is directly or indirectly related to the production of food products, the acquisition of resources, and the processing and production of ready food was considered. The way gender affects people's decision to work in this sector and university graduates' perception of agribusiness being an ideal job were also analysed.

A total of 485 students, from four fields of study, from the Poznań University of Life Sciences were surveyed between 2016 and 2019. In the case of undergraduate students, it was determined that while they perceive that working in agribusiness is an interesting career stage, they are also convinced that they could easily find a job outside of this sector. Additionally, from a gender perspective, men and women view working in agribusiness differently. Women see it as an opportunity for self-development and building good social relations as well as acting for the benefit of the environment. For men, job-related prestige and economic benefits are much more important. Men were found to have higher aspirations for pursuing their own businesses, whereas women were more likely to pursue further education. The attitudes towards working in agribusiness represented by the respondents are a good predictor of meeting its knowledge needs.

It should be noted that the research sample's gender structure reflects that of the general Poznań University of Life Sciences student population, which confirms the strong feminisation the university's courses.

Most respondents were between 21 and 23 years of age and had not yet taken their diploma exam (final engineering or undergraduate exam). Information provided by students throughout the study included that related to basic research aspects, sociodemographic characteristics, work experience and plans to start a business after graduation. A total of 29 characteristics of an ideal job and 5 questions about working in agribusiness were assessed. The evaluation was performed using a seven-point Likert scale (1—definitely not, 4—no opinion, 7—definitely yes), the use of which made it possible to increase the difference measurement sensitivity in the evaluation of the characteristics examined.

The main part of the survey instrument consisted of questions about the characteristics of a potential workplace that determine whether it is an ideal job. Five job dimensions were examined, i.e., job contents (10 features), economic benefits (4 features), career opportunities (5 features), social relations (5 features), and reputation (4 features).

Based on the conducted research, the following conclusions can be drawn:

1. In the opinion of the surveyed students (men and women), working conditions in agribusiness are close to those expected and accepted by them. Work in this sector is also an interesting space for both gainful employment and running one's own business.

2. Men are distinguished by their tendency to start their careers earlier and to strive for professional success; economic satisfaction and the reputation of the workplace are more important than loyalty to the employer.

3. Women prefer the possibility of self-development through full higher education (Bachelor's and Master's degrees). Moreover, they are characterised by later entry into the labour market, the expectation of good social relations in the place of employment, stronger loyalty to the employer and greater sensitivity to environmental protection problems.

4. The stated preferences of the surveyed students (men and women) are a good prognosis for meeting the needs of agribusiness in terms of knowledge and competences of employees. The presented results are certainly not exhaustive, but they can be a useful source of knowledge about the expectations of young people in the labour market, both for managers working in agribusiness companies and for those involved in recruitment for this sector. They may also be useful for managers of companies from other industries. We hope that they will encourage further research into the labour market, dominated by Generation Z in other sectors. To conclude, we would like to note that our research is causal and needs to be continued in other countries.

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## **6.2 Are the financial results of selected companies listed on the Warsaw stock exchange related to non-financial information presented in CSR reports. Based on the example of polish companies (Małgorzata Anna WEGRZYŃSKA<sup>1</sup>, Lidia BEDNAREK<sup>2</sup>, Katarzyna BOSACKA<sup>3</sup>)**

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**Keywords:** CSR, statistical text analysis, FOG index, financial performance of responsible companies, non-financial information

**JEL:** M40, M41, Q56

Corporate Social Responsibility (CSR) is a concept applied by an increasing number of companies to take action to, among other things, reduce their environmental impact. For this reason, companies prepare annual reports describing the actions they have taken to implement CSR.

At the same time, there was a development in financial reporting, allowing information to be provided on the financial performance of companies. With time, data related to the non-financial situation of companies also started to appear in reports, which resulted in the development of accounting narratives [1].

This article aims to answer the question if there is a relationship between financial and non-financial information in the reports of the studied business entities. For the research objective thus formulated, the following research hypotheses were defined:

Hypothesis 1 (H1): There are significant differences in the linguistic structure in the studied CSR reports in Poland.

Hypothesis 2 (H2): The texts of CSR reports of Polish public companies are comprehensible for their recipients.

Hypothesis 3 (H3): There is a relationship between non-financial and financial information between Polish listed companies.

The research sample consisted of companies listed on the Warsaw Stock Exchange between 2016 and 2018, which belong to two stock market indices: WIG Fuels and WIG Chemical. The sample consists of 11 companies. The selection of the companies indicated was deliberate. The selection of the index was guided by the environmental impact degree of the company's activities and the production of a CSR report between 2016 and 2018. A total of 33 CSR reports regarding WIG Fuels and WIG Chemical companies were examined.

The first research hypothesis (H1) was verified using statistical text analysis. The second research hypothesis (H2) was verified using the FOG index. To verify the third hypothesis (H3), a panel data analysis was conducted with a number of significant variables selected. The panel data analysis included companies surveyed from 2016 to 2018.

The findings on H1 showed that reports of chemical companies were shorter than reports of oil companies. On the other hand, in terms of the average length of text units, the reports for both indices were similar. The same occurred with the structure of the analysed texts of CSR reports. The percentage of verbs and nouns was at a similar level. The only difference concerns the percentage of adjectives.

The FOG index values verifying H2 were at the same level and indicated that the texts of the analysed CSR reports would be understood by primary school pupils.

Following the panel data analysis, i.e. the verification of hypothesis H3, it was found that there are relationships between non-financial information and financial information. This was particularly evident in the ROA and the SIZE variables.

Summing up, the following conclusions can be drawn from the research carried out:

1. CSR reports prepared in the surveyed companies were at a similar level of linguistic difficulty,

2. the texts of CSR reports of public companies are understandable regardless of education,
3. there is a link between non-financial and financial information in terms of describing the profitability of the companies studied and describing the total size of the company.

**Acknowledgements:** The Faculty of Economics at the Poznań University of Life Sciences

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### **6.3 Relationship of financial results of enterprises with reporting of Corporate Social Responsibility (CSR): Polish case study** *(Małgorzata WĘGRZYŃSKA<sup>1</sup>, Alina NOWOTARSKA<sup>2</sup>)*

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**Keywords:** CSR, financial statements, agricultural accounting, agri-food enterprises  
**JEL:** Q14, M14, P48, O1

**Purpose:** In this paper the main research aim stated that Polish companies listed on the Stock Exchange, voluntarily release information concerning CSR and their presentation in company financial reports is a determinant of social responsibility, the so-called corporate responsibility.

**Materials and Methods:** The subject of the study constituting the basis for the verification of the research hypothesis includes: Polish and foreign literature, Polish and foreign legal regulations, CSR reports, Financial reports for the years 2013-2018.

Objects of this study conducted to verify the research hypothesis included economic entities operating in the agricultural sector. Investigations were carried out on over 100 companies from the agricultural sector active in the Republic of Poland. The research hypothesis was verified using modified econometric modelling, which has not been used to investigate CSR in Polish economic entities.

**Research and practical implications:** Corporate social responsibility (CSR) is connected with voluntary commitment to activities, which are considered to promote public good and which extend beyond the interests of a given economic entity or imposed legal requirements (McWilliams and Siegel, 2001, 2006; Huang and Watson 2015). This results in the incorporation of economic, legal, ethical and philanthropic responsibility into the corporate decision making processes (Węgrzyńska, 2015). For this reason Corporate Social Responsibility (CSR) is increasingly often the object of operations in economic entities as an aspect potentially increasing their competitive edge. The percentage of economic entities, which voluntarily publish CSR reports, has increased considerably (Nazari, et al., 2017). For this reason the release of CSR reports, particularly their scope, have become the subject of research in the last decade. Studies conducted on various groups of economic entities in different branches of the economy have provided conflicting results. However, it is assumed that CSR provides the competitive advantage of economic entities (Margolis, et al., 2009; Maqbool and Zameer, 2017). The primary premise stating that CSR improves the financial results is related with the theory of stakeholders (Freeman, 1984). This theory indicates that success of an economic entity is dependent on permanent relationships with stakeholders, while management of these relationships has become a significant tool in the formation of value (Hammann, et al., 2009; Maqbool and Zameer, 2017). Obligatory publication of financial information is strictly regulated by legal acts and international recommendations (e.g. MSR/MSSF, GAAP UK, GAAP US), but the arbitrary character of CSR reporting provides managers of such entities with the motivation to modify their effectiveness in terms of CSR (Leung et al., 2015; Mahoney et al., 2013). At present corporate social responsibility of business organisations is closely related to sustainable development of a given economic entity. KPMG (2013) reports that 14% of the 100 largest companies in the world use the term "corporate responsibility", 25% companies refer to "social business responsibility", while 43% firms talk about "sustainable development", while in papers contained in this review "corporate social responsibility" is the dominant term (Huang and Watson, 2015). Independently of CSR another approach is related with Integrated reporting (IR), i.e. concept also referring to CSR. An integrated report "is a cohesive statement on the manner, in which strategy, management, results and prospects of an organisation with respect to the external environment lead to the development of value in a short-, medium- and long-term scale" (IIRC, 2013). Thus a natural relationship is observed between CSR and financial reporting, since financial reporting carries the general liability for the measurement, publication and provision of information, including information concerning CSR. Expert accountants may participate in the formation, provision, release and analysis of CSR reports. Moreover, CSR was initiated as a form of self-regulation, while in some cases even at present



there is no formal regulatory structure, responsibility for CSR reporting is partly imposed on specialists in accounting. Thus accounting plays an important role in corporate social responsibility of business entities.

**Findings:** Preliminary pilot research results indicate that better presentation of the CSR concept in corporate reports is closely related to greater reading ease and longer CSR disclosure time frame. These results tend to be the same for each of the investigated social and environmental aspects of CSR. Another one is that shorter and less readable CSR reports indicate attempts to present the image of a socially responsible economic entity; however, this is inconsistent with actual social and environmental results), its perception may affect decisions undertaken by consumers and investors.

**Conclusion:** This study aimed at the identification of the relationship between CSR efficiency and complexity of voluntary disclosure of CSR, measured by readability of CSR disclosure and the volume of CSR reports in economic entities within the agricultural sector in the years 2012-2017. It was preliminarily assumed that shorter and less readable CSR disclosure documents indicate inferior efficiency of CSR, while increased disclosure and more readable CSR reports indicate better efficiency of CSR. Moreover, it was assumed that CSR efficiency, as well as each of its social and environmental aspects are positively related with the scope of CSR disclosure. Based on these findings it was stated that longer CSR disclosure enhances their transparency and reliability.

## 6.4 Innovative activities of dairy producers as a response to Green Deal requirements

(Alina NOWOTARSKA<sup>1</sup>, Wojciech STYBURSKI<sup>2</sup>, Klaudia SPYCH<sup>3</sup>, Paulina Luiza WIZA<sup>4</sup>)

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**Keywords:** agricultural producer groups, innovations in the activities of the milk producer groups, milk production, milk market

**JEL:** J54, O13, O35, P01

Many years of experience, both in Europe and Poland, clearly indicate that farmers' associations provide a number of benefits. They allow, among other things, to reduce management costs, obtain a better bargaining position both in commercial outlets and markets providing inputs, as well as acquire access to market information. Additionally, thanks to the horizontal and vertical integration of producers they may supply the market with large quantities of uniform product batches characterised by consistent quality as well as establish direct contacts with customers, which results in the shortening of supply chains. Cooperation within agricultural producer groups makes it possible to reduce the role of intermediaries and take over their part of the trade margin, resulting in greater production profitability, while establishing a more stable position on the market and increasing producers' income. Under competitive market conditions, the improvement of agricultural production efficiency is a key challenge faced both by individual farmers and producer groups. This is particularly true for product markets that require modern production technologies, as well as quality animal and plant genetic resources. This is obviously the case also in the dairy market. It is an important element of the national economy, as it satisfies both the domestic demand for milk and dairy products and their exports, while at the same time ensuring sustainability of dairy cattle production in Poland.

The article aims to present innovative changes that are necessary to improve the competitiveness of farms associated in milk producer groups at increasing competition and decreasing profitability of general agricultural production. In order to achieve this objective, it was decided to analyse literature on the subject related to issues concerning the agricultural market, agricultural sector markets, including the dairy market, as well as the functioning of agricultural producer groups, organisational innovations, etc. Source information covering the period from 2018 to 2020 was obtained from Agro Integracja Sp. z o. o., as an entity providing consultancy services, among other things aiding the association of farmers to establish producer groups. The article presents innovations implemented by four milk producer groups operating in the Krotoszyn county. Activities undertaken by the agricultural producer groups under study comprise a range of initiatives and investments responding to the recommendations of the Green Deal and particularly relating to the CAP's ninth objective of "*Improving the response of EU agriculture to societal demands for food and health, including safe, nutritious and sustainable food, reducing food waste, as well as animal welfare*". The results of the analysis are presented in the descriptive, tabular and graphical form.

Depending on the character of a company's business, different aspects of Corporate Social Responsibility (CSR) constitute a source of innovation more than any other areas. In the case of producer groups related to the milk market, innovativeness is closely linked to the concept of CSR, which involves a situation when there is adequate capital to implement these activities and activities of the managing entity. Thanks to the know-how and resources received, the approach to production adopted by the members of the producer groups, as well as the way they perceive the reality and conduct business, is changing. In the case under study, the capital consists of a subsidy granted within the framework of CAP, and the managing entity is the aforementioned Agro Integracja Sp. z o. o.

Greenhouse gas emissions may be reduced as a result of enhanced efficiency in the use of inputs in the process of milk production. Thanks to the actions taken, synergy was obtained, which has resulted in a permanent competitive advantage of individual producer groups within the industry both at the regional and national levels.

It was confirmed that the activities of the analysed producer groups have taken an innovative direction with regard to investment of funds received by the groups to support their activities. Such innovation consists primarily in the implementation of three extremely important postulates: 1 - determining the health condition of the herd through animal blood testing (to control the incidence of IBR and BVD, etc.), 2 - developing a farm management strategy and preventing disease incidence or spread (resulting in a smaller number of mastitis cases, reduced antibiotic use, targeted treatment), and 3 - maintenance or upgrading the gene pool of the herd.

## 6.5 The functioning of companies from the dairy industry during the COVID-19 pandemic

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**Keywords:** *dairy industry, COVID-19 pandemic, effects of the pandemic, corporate social responsibility, entrepreneurship*

**JEL:** D81, L26, Q1.

The COVID-19 pandemic has hit every sector of the economy. Pandemic shock is an important resilience test for the economy. Both entrepreneurs and policy makers need to respond effectively to the rapidly changing economic landscape. Despite continued growth and relative resilience, the agri-food industry, including the dairy industry, suffered during the pandemic. While the shock required a comprehensive response to support the hardest-hit industries, it also accelerated some trends that could already be observed in the agri-food and dairy industries.

At national level, the weakest elements that could hold back economic growth are the aging of the workforce, labor shortages, increasing pressure on cost competitiveness and heavy dependence on external markets. In addition, there are also weaknesses specific to the agri-food industry and the dairy industry. These include the declining share of employment in agriculture, production instability, production adjustment costs, and for certain producers also import dependency and export-driven demand.

The COVID-19 shocks and their effects on the dairy industry and the entire agri-food sector are threefold. The most immediate are real shocks, which include changes in demand and a blockage of supply. The second type of shocks are financial shocks. Due to the impetus in the financial sector, the dairy industry will find it more difficult to obtain the necessary investments and capital, and at the same time it will have to face a reduction in international capital flows. The third type of shocks relates to behavioral changes, both on the side of consumers, who may change their consumption pattern depending on the level of risk aversion, and on the side of enterprises, due to increasing uncertainty about future production and possible legislative changes.

The COVID-19 pandemic has significantly disrupted the functioning of all sectors of the agri-food industry in Poland. These disruptions, while having a very negative impact, at the same time intensified trends to which the industry would have to adapt anyway. The most important of these trends are digitization and changing consumer preferences. They create opportunities for a more sustainable reconstruction. However, various stakeholders along the agri-food value chain need to prepare for the greater structural changes that will affect the sector, including climate change and stricter environmental legislation. To some extent, the pandemic is a precursor to these changes.

The aim of the research was to present and determine the significance of the introduced restrictions related to the COVID-19 pandemic on the dairy industry in Poland, by answering the question of how the coronavirus pandemic changed the functioning of dairy enterprises and farms specializing in milk production. The study was based on the study of literature and based on in-depth interviews conducted in the period from March to December 2020 year among selected dairy enterprises located in the Wielkopolska Region.

Based on the conducted analyzes, it was found that the slowdown of the economy and the closure of the borders caused by the COVID-19 pandemic contributed to a decrease in the value of exports of dairy products, and dairy companies were obliged to introduce specific hygienic and sanitary restrictions in connection with the situation related to the coronavirus pandemic, consisting of, among others on the obligation of each employee to wear a protective mask and gloves, as well as to observe hygiene by frequent disinfection of hands and maintaining distances between workplaces. In the period from March to April 2020, the surveyed dairy enterprises incurred increased expenses on hygiene products, which was related to the increase in prices for these products, due to the

increased demand caused by the COVID-19 pandemic. The continuing pandemic contributed to the decline in prices per liter of milk, which led to a deterioration in the financial situation of farms specializing in milk production. Many agribusiness entities (including the surveyed dairy enterprises) have decided to implement socially responsible activities to maintain the efficiency of functioning while maintaining the safety of employees, customers and the natural environment.

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**ISBN: 978-83-7160-994-7**

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