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SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN THE MEAT INDUSTRY IN POLAND

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Abstract: Every type of business is closely related to the flow processes of various types of goods. The flow process begins at the source of raw materials until it reaches the final customer. A corollary to the newly emerging challenges of both social and environmental management of increasingly complex supply chains is the issue of sustainable supply chain management. The meat industry, along with its entire supply chain, is subject to cyclical crises, with different foundations and negative effects on individual links. One of the reasons for the crises in the meat industry is the management of supply chains based primarily on economic objectives to the exclusion of social and environmental aspects. The purpose of the article is to assess the level of sustainable supply chain management in the meat industry. The research problem is to determine the involvement of meat industry companies in the various dimensions of sustainability: economic, social and environmental. Therefore, a special online survey questionnaire was created, where potential respondents representing 93 meat companies were identified and purposely selected. After receiving and verifying the completed questionnaires, 85 completely completed questionnaires were qualified for further analysis and a coding process was carried out using Excel software, then the data was imported into Statistica statistical software, where the main statistical analyses were carried out.

1 Introduction

In the rapid growth of the global economy is giving rise to increasingly complex yet uncertain supply chains, both domestic and international. Until recently, companies dealt with this by introducing various supply chain management, risk management techniques to a more or less advanced degree. For several years now, companies have been facing the new challenge of sustainability.

Over the years, the issue of sustainability has become a priority thus its essence has begun to play an increasingly important role in the agendas of international communities. The starting point was the creation of the Brundtland Report in 1987 entitled, "Our Common Future," which, among other things, defined sustainable development as one that meets the current needs of society while not compromising future generations to meet their needs. Subsequently, the issue of sustainable development was repeatedly analysed at many international conferences with the final result being recommendations for the development of national strategies that take into account the economic social and environmental aspects of sustainable development. Since then, public interest in the issue of sustainability has continued to grow.

Companies previously focused solely on economic profit and ignoring environmental and social aspects had to implement pro-social and pro-environmental measures to become leaders in their industry. Companies involved in the supply chain decided to modernize it to satisfy all three aspects of sustainability. However, in the case of the food supply chain, things were a bit more complicated because assumptions did not make it easy to achieve the goal.

In the 21st century, the awareness of the potential consumer is increasing, in addition, an upward trend of interest in the eco-friendly sphere has been noted. Researchers say that it is more and more common to analyse various characteristics of a product before buying it. Relating this to the meat industry in Poland, the customer analyses a number of important issues before buying, such as:

- The origin of the product (opinion of the butcher or processing plant).
- The origin of the livestock from which the product was made (domestic/imported) (organic farming/non-organic farming).
- The type of packaging the product comes in (eco-friendly or not).

Companies wishing to fit into the highest standards imposed by consumers must manage their supply chain in a sustainable manner, which means affecting all three aspects equally. Important measures taken by companies include the selection of sustainable contractors, the implementation of environmentally friendly production processes and greater focus on the needs of employees.

Companies in the meat industry face a tough challenge, because in addition to the many requirements imposed by consumers on the quality of products, they are exposed as an industry to cyclical crises caused by threats of various origins. Pointing out as examples from recent years will be the swine flu pandemic year 2009-2010, the COVID-19 pandemic from 2020, African swine fever (ASF)-the first outbreaks in 2014, followed by the return of the disease in 2021, Avian Influenza outbreaks in 2021. Each of these

phenomena causes a crisis, which affects supply chain management in the form of a reduction in the amount of livestock on the market, halting or reducing supplies, processing, sales.

To achieve a practical result, companies must combine supply chain and sustainability knowledge along with social responsibility. Taking responsibility for all processes in the transition of a product starting from the raising of the slaughtered livestock to the delivery of the final product to store shelves taking into account the waste generated during production is the essence of sustainable supply chain management in the meat industry. Recent years have shown that even the largest meat processing plants or slaughterhouses can face a crisis caused by a lack of awareness of social and environmental risks, despite a mature approach to social responsibility.

Therefore, the topic is extremely important in terms of determining the theoretical basis for studying the level of sustainability of supply chain management in the meat industry. And in practical terms, to formulate solutions to stabilize the meat industry on this level by implementing sustainable supply chain management based mainly on close cooperation.

The purpose of the article is to assess the level of sustainable supply chain management in the meat industry. The research problem is to determine the involvement of meat industry companies in the various dimensions of sustainability: economic, social and environmental.

The gist of the article rises as talk of responsible production and consumption is in The-Sustainable-Development-Goals-Report-2022 prepared by the United Nations Department of Economic and Social Affairs Statistics Division in 2022. The slogan promoting the report was the words of António Guterres (Secretary-General, United Nations), "*We must rise higher to rescue the Sustainable Development Goals - and stay true to our promise of a world of peace, dignity and prosperity on a healthy planet.*" More specifically, the 12th goal of this report is dedicated to production and consumption. Delving deeper into the content, we find disturbing information about the scale of the problem, which is briefly described as: , "*Unsustainable patterns of consumption and production are root causes of the triple planetary crises of climate change, biodiversity loss and pollution. These crises, and related environmental degradation, threaten human well-being and achievement of the SDGs.*" [1]. Information on how to deal with this problem is also included: , "*Transforming our relationship with nature is key to a sustainable future. As the world develops strategies for sustainable recovery from the pandemic, governments and all citizens should seize the opportunity to work together to improve resource efficiency, reduce waste and pollution, and shape a new circular economy.* " [1]. The UN policy emphatically underscores the magnitude of the problem facing the world in this time of crisis, and this article can be the basis for research and analysis in every sector of the food economy for actual analysis for 2023.

1.1 Sustainable supply chain management (SSCM)

The issue of sustainability is a rapidly growing area of research that represents the interests of business, science and associations. It is defined and interpreted in various ways and contexts. The concept is increasingly pointing the way forward for business, and more companies are incorporating social and environmental criteria into their operations. Sustainable supply chain management (SSCM) has grown significantly and has become a subject of increased concern due to environmental resource limitations, a global population explosion, the corruption of logistics production and consumption activities, and waste and pollution increases [2]. Sustainable supply chain management (SSCM) has received much attention in the decade ending in 2020 due to an increased awareness of climate change and environmental and social issues across the globe. The current trend of disaggregating global supply chains increases the need to expand sustainability efforts beyond firm boundaries [3]. At the same time, this creates a significant regulatory problem. In recent years, pressure has increased on private sectors to take responsibility for social and environmental issues. [4] SSCM requires firms across a supply chain to report not only on profits but also on environmental and social performance [5]. To achieve the objectives of SSCM, firms should set long-term goals on sustainability, be transparent in their reporting, develop a culture of sustainability and manage supply chain risks appropriately [6]. Sustainability refers to the integration of environmental, economic and social goals to meet current needs without compromising the needs of future generations [7,8]. Sustainable supply chain management can also be defined as optimizing a company's processes and operations with low-impact environmental protection and increasing social benefits through their corporate social responsibility [9]. Sustainable supply chain management (SSCM) integrates economic, social and environmental supply chain objectives to improve long-term performance by assessing and monitoring business performance against social, environmental and economic dimensions [10]. Adoption and implementation of SSCM provide many benefits to the firms this include reduction in cost of product, better customer–supplier relationship, achieving circular economy etc. [11].

Social sustainability encompasses the concepts of equality, empowerment, accessibility, participation, identity culture and institutional stability. The concept suggests that people matter because development is about people. Essentially, sustainable social development means a system of social organization that alleviates poverty. Examples of social sustainability include ensuring fair policies, ethical practices, equal opportunities, diversity [12-14].

The concept of environmental sustainability refers to the natural environment and how it remains productive and resilient to support human life. Environmental sustainability involves the ecosystem integrity and carrying capacity of the natural environment. It requires natural capital used sustainably as a source of economic inputs and as a sink for waste. When a supply chain is environmentally sustainable, it is known as a green supply chain. Examples of an environmentally sustainable supply chain include the treatment of waste, recycling, environmental education and training, green purchasing, green manufacturing, and green design [15]. Reducing the environmental impact of business activities taking into account all links in the supply chain, taking into account the interconnections and interactions between them and the natural environment, is becoming an increasingly important challenge. Such a comprehensive approach enables effective environmental action, while increasing opportunities for eco-innovative solutions. [16,17] Issues related to green supply chain management in Poland are considered within the framework of various directions and currents of organization and management theory [18,19].

Scientists say that due to population growth, human needs such as food, clothing, housing are increasing, but the means and resources available in the world cannot be increased to meet the demands always. Economic sustainability therefore requires that decisions be made in the most equitable and financially viable and possible way, taking into account other aspects of sustainability. Examples of economic sustainability include cost reduction, on-time delivery, reliability, and quality [20].

Sustainability is a long-term focused approach to business. It represents the creation of such systems and processes that are able to endure into long time work. Given that businesses have their economic nature but operate within certain environments and social systems, the study of sustainability is not limited to the environmental issues [21]. The three key dimensions in which sustainability needs to be studied are economic, ecological but also social [22].

Sustainable supply chain management is a fundamental aspect of the construction of competitive advantage in global markets as it aims to optimize the consumption of resources by applying the principles and practices of the circular economy, operating under moral principles that guide the actors in the chain in what and how to sustain value and reciprocity relations [23]. The integration of sustainability practices at inter and intra level of an organization's supply chain is positively linked to its environmental and social performance [24]. A lack of sustainability integration can affect the overall sustainability performance of the supply chain. Sustainable development is now not only a necessity but also emerged as a potential game-changer for organizations. Increasing numbers of companies are now committing to the cause of sustainability in their supply chain [25]. Global competition is putting more pressure on the government authorities, for the implementation of environmental regulations that stimulate greater sustainability in manufacturing companies through the best practices of supply chains [26]. With such policies, producers must optimize their systems and focus the efforts on fostering bio-economy, as well as ecofriendly goods and markets to increase the environmental performance as demand for environment low-impact products grows [27]. Kulchitaphong et al., [28] have conducted research that allows entrepreneurs to define strategies and goals to create mechanisms and actions to achieve customer needs, satisfy customers, build trust, accumulate loyalty, and lead to sustainable consumption in the end.

1.2 Characteristics of the supply chain in the meat industry in Poland

In order to properly characterize the meat supply chain in Poland, general data on meat production and consumption in Poland are presented and discussed at the outset Table 1 and Table 2 . They are intended to illustrate the scale of market demand for meat products and the production capacity of plants in recent years. Next, the definition of the food supply chain was refreshed, after which the food supply chain in Poland was discussed and illustrated in detail.

Table 1 Slaughter livestock production in Poland for 2020-2021

DESCRIPTION	MEASUREMENT	SUPPLIES				
		2015	2019	2020	2021	DIFF
Meat total	thousands of tons	3652	4043	4194	4348	119.1
Raw meat from slaughter animals	thousands of tons	2077	2296	2413	2543	122.4
Poultry	thousands of tons	1575	1747	1782	1805	114.6
Canned goods, cold cuts, poultry sausage products	thousands of tons	176	128	136	105	59.7
Meat and offal preparations from slaughtered animals (canned meat, cold cuts, sausage products and other preparations)	thousands of tons	897	862	803	837	93.3

Source: CSO data source

Table 1 shows an overall significant increase in total meat in 2021 compared to 2015-a difference of 19.1%. Discussing the tables in detail, an upward trend can be seen for raw meat from slaughter animals 22.4%, poultry 14.6%.

In contrast to raw meat- processed meat and offal from slaughter animals recorded a decrease of 6.7%. In contrast, shipments of canned meat, cured meats and poultry sausage products recorded a huge decline of as much as 40.3% compared to 2015.

Analyzing the results of Table 1, it can be said that over the years, canned goods, cold cuts, poultry sausage products and Meat and offal preparations from slaughtered animals had an overall downward trend. However, there appears some deviation of the downward trend over 2019/2020/2021 even it can be said that it was at times upward over these years. A factor that may have caused this was the outbreak of Pandemic COVID-19 and its aftermath across the country. The public, wanting to secure in the knowledge of how long this condition could last, increased their interest in products with longer shelf life when shopping, which was anyway hampered during the lockdown. Many local butcher shops were able to interrupt their operations, which further motivated consumers to increase their interest in ready-made products from store shelves.

Table 2 Per capita consumption of meat consumer goods in Poland 2015-2021

DESCRIPTION	MEASUREMENT	2015	2019	2020	2021
Meat and offal (including intended for processing)	kg	75.0	75.9	77.6	77.5
including meat	kg	70.9	71.4	72.9	73.8
Edible animal fats	kg	5.8	6.0	6.0	6.9

Source: CSO data source

The Table 2 indicates the meat consumption per capita for 2015-2021 in Poland . Considering the data in the table, we see an overall upward trend in meat and offal consumption of 2.5kg. Specifically, meat consumption increases by 2.9kg per capita in Poland, while consumption of animal edible fats increases by 1.1kg relative to 2015.

Food products typically pose additional challenges to logistics and transportation due to their perishability, limited storage capacity, security and traceability requirements [29,30]. Modern food supply chains are increasingly complex and contain multi-level stakeholder relationships that compete to stay in the chain and serve customers [31]. Food supply chains around the world, involve a large number of stakeholders, and the average distance food travels from the producer to the end consumer has increased dramatically over the past two decades [32]. The food supply chain (FSC) is a network of activities aimed at providing food for the public and maintaining food security [33]. As in other supply chain scenarios, different actors interact with each other at different stages of the FSC, such as production, processing, distribution and consumption. The actors in the food chain form an ordered set of actor groups dealing with specific areas indicated in Figure 1. Here we can distinguish between, producers (farmers, growers), food processors, transport and storage operators and retailers. In a broader aspect, the ordered groups can include the group of consumers located just behind the traders. Organizations producing equipment for other groups such as packaging, cleaning products, ingredients and additives should not be overlooked either [34].

Figure 1 Diagram of the food supply chain [35]

The Figure 2 below provides an overview of the meat industry supply chain in Poland. It is referenced for each type of slaughter livestock including: beef pork or poultry. It is intended to characterize the different groups of the chain in an orderly sequence.

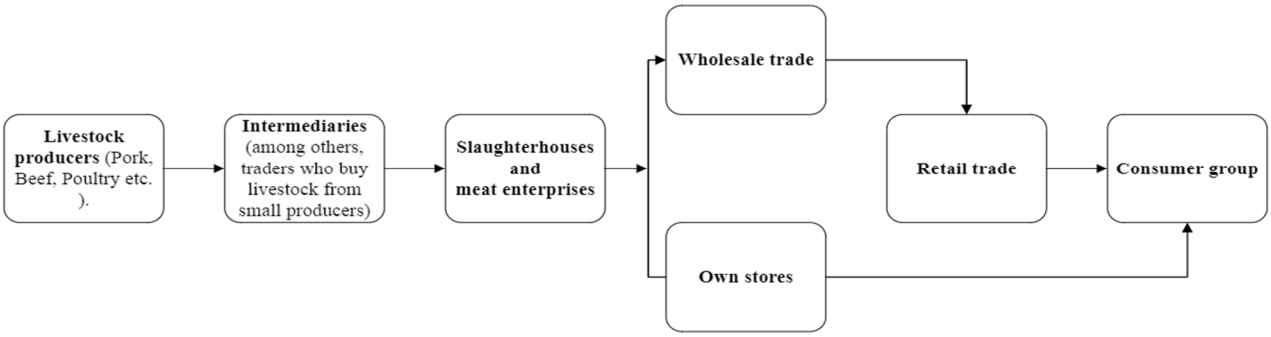

Figure 2 Simplified Meat Supply Chain in Poland [36]

The first link in the supply chain of any type of slaughter livestock is the producers. This is the most numerous group of all in the meat industry supply chain in Poland. Livestock is purchased through purchasing points, middlemen, not forgetting, of course, the import of livestock. The ways in which butchers and other meat processing plants are supplied depend on their economic position in the market [37]. As can be deduced, the next link is middlemen, who, buying from individual producers-usually small ones-give them the opportunity to sell animals, buying at a discounted price while selling to butcher plants at a profit. In the current era of shortages in sales markets, meat plants are trying to use various sources of domestic and foreign supplies. There is also the aspect of contracting agreements here, the beneficiaries of which are farms with large production capacities that do not allow themselves to interrupt the supply of livestock to butcher plants. The next link is the butcheries and meat processing plants, which are involved in the slaughtering processing or production of meat products. After the production stage, they distribute their products through their own stores or wholesale market from where the products reach the retail market and then directly to the consumer group.

Unfortunately, pig producers are the weakest link in the supply chain. This is due to the fact that the supply chain for pork products is characterized by a high degree of fragmentation and, in addition, there is a lack of permanent links (including capital links) between breeders and slaughterhouses. A similar situation to that of pigs is also observed in the cattle sector. A slow process of livestock concentration is taking place, and this is mainly due to the specialization of farms in milk production. The number of cattle farms is decreasing and, at the same time, the cattle density per 100 hectares of farmland is increasing. Poland is part of the global trends of intensification and industrialization of livestock production, globalization and liberalization of meat trade. There are many small and medium-sized farms engaged in livestock breeding and rearing, although their number is slowly declining. Industrial animal husbandry is contributing to the liquidation of many small farms and the depopulation of rural areas [38]. The organizational characteristic of the market in Poland is the multiplicity of production entities, i.e. breeders. This results in a consequent fragmentation of the supply structure. As a result, processes that streamline supply and build up the raw material base for meat plants have become very important.

The last group is a very demanding group and imposes new trends on the meat industry, which has existed in Poland for a long time. The change in consumer perception of the very process of raising, producing, processing or selling meat dramatically affects their final choice of product from the store shelf. Here we have an increased interest in sustainability especially in environmental and social aspects by the consumer group. More and more details about the company offering the product - its supply chain, production or processing process, labour policy are of interest to consumers before making a choice. Therefore, it is important for companies wishing to be competitive in the market to adhere to sustainable supply chain standards in all three environmental, social and economic aspects. While increasingly more companies are disclosing sustainability information, corporate reports may be overly optimistic about companies' actual practices, especially when it comes to ensuring the sustainability of the entire supply chain, where unsustainable practices can be hidden [39].

2 Methodology

The main objective of the conducted research was to identify key areas related to the implementation of the concept of sustainable supply chains in companies operating in the meat industry. To achieve the adopted goal, a survey questionnaire was developed, consisting of nine questions covering two parts of the survey:

- a survey metric containing an introduction, which includes the purpose of the survey being conducted, how the data obtained will be used, and assurances of the anonymity of the feedback received. In addition, the part included questions about the size of the company, the duration of its operations and the definition of its business profile,
- the research part of the questionnaire, which included questions on: the importance of the determinants of LAC in the practical implementation of the concept, the use of business, environmental and social elements affecting the level of sustainable supply chain management, and the

identification of the main impediments affecting the introduction of the concept.

The research population consisted of enterprises of the meat industry, which number about 1,250 in Poland, based on data from the Central Statistical Office and IERiGŻ-PIB.

The research was carried out between February and September 2022, it took the form of a survey prepared online where potential respondents representing 93 meat industry enterprises were identified and purposively selected and asked by phone or email to complete the survey. The possibilities of collecting data for the purposes of this study are limited which meant that the research sample size could not be considered representative.

After receiving and verifying the completed questionnaires, 85 completely filled out questionnaires were qualified for further analysis and the coding process was carried out, using Excel software, then the data was imported into Statistica statistical software, where the main statistical analyses were carried out.

The responses obtained constituted the primary data, which were subjected to further analyses, both quantitative and qualitative in nature. For quantitative analyses, an Excel spreadsheet was used. On the other hand, since the questions in the survey questionnaire took the form of questions using a 5-point Likert scale, appropriate statistical methods were used to conduct the analyses, in this case analysis of the r-Pearson correlation coefficient, which is used to test whether there are significant statistical relationships between two variables. The r-Pearson score can take values between -1 and 1, where values of -1 or 1 indicate a perfect correlation between the variables under study, and a score of 0 indicates the absence of a correlation. In addition, it is assumed that values in the ranges:

0 - 0.3 - indicate weak correlation,
0.3 - 0.5 - denote moderate correlation,
0.5 - 0.7 - denote strong correlation,
0.7 - 1 - denote very strong correlation

The choice of this coefficient was dictated by the fact that it is perceived as the strongest and strongest coefficient, the results of which have the highest reliability.

3 Result and discussion

Analyzing meat industry research subjects, the following questions were asked and data was obtained for further consideration:

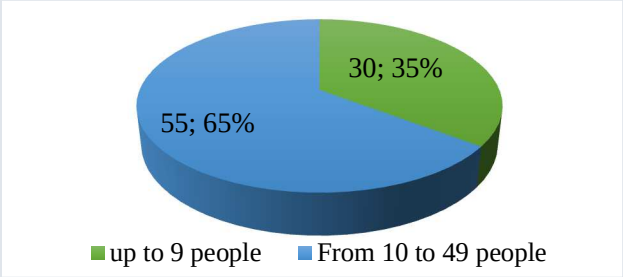

Figure 3 Number of employees working for the company
Source: Own compilation based on survey.

In the survey, 65% of the enterprises were small businesses, employing between 10 and 49 people, with the remaining group being micro-enterprises (Figure 3). The survey also had possible answers of 49 to 249 people and 250 or more people, but they were not selected even once.

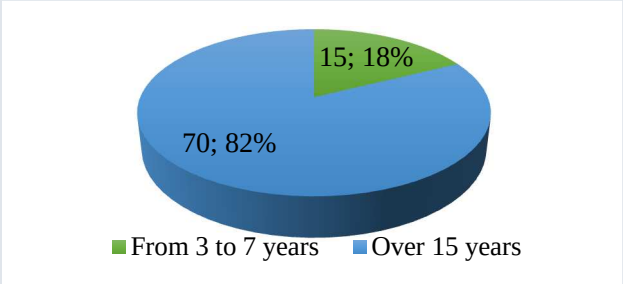

Figure 4 The period in which the company operates in the domestic market
Source: Own compilation based on survey.

More than ¾ of the surveyed enterprises have been in the market for more than 15 years, while the remaining 18% are young enterprises, operating in the market for no more than 7 years (Figure 4). In this case, too, there was a wider choice of answers: respondents could mark: less than 3 years or 8 to 15 years, however, such respondents could not be reached.

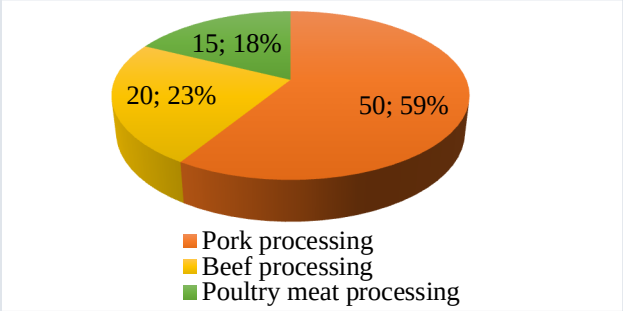

Figure 5 Type of meat industry of the company
Source: Own compilation based on survey.

Almost 60% of them represented pork processing, less than ¼ represented beef processing, and the remaining 17% were poultry meat processing enterprises (Figure 5).

The next question analyzed the determinants of supply chain management in meat companies.

Table 3 Indicate the importance of the following determinants of SCM in terms of their impact on the application of the concept in practice?

1 = Not important, 2 = Slighlty important, 3 = Neutral, 4 = Important, 5 = Very Important.		**average**	**median**	**St. Dev.**
a	Increased competition	4.59	5	0.49
b	The needs of the end customer	5.00	5	0.00
c	Process integration of supply chain processes	4.18	4	0.78
d	Cooperation of supply chain members	4.41	4	0.49
e	Cost reduction	4.12	5	1.23
f	Improve processes and improve productivity	4.82	5	0.38
g	Internal inter-functional cooperation	4.82	5	0.38

Source: Own compilation based on survey.

All of the companies that participated in the survey in the area of indicating the determinants of SCM indicated the needs of the end customer. Determinants in the form of process improvement and productivity improvement, as well as internal inter-functional cooperation came in second place. The lowest rated determinant was cost reduction and the process of integrating processes within the supply chain.

Table 4 How important are the following sustainability business elements used by you that influence the SCM?

1 = Not important, 2 = Slighlty important, 3 = Neutral, 4 = Important, 5 = Very Important.		**average**	**median**	**St. Dev.**
a	Collaboration in inventory and logistics management	4.65	5	0.48
b	Use of information technology to increase communication efficiency	3.94	4	1.16
c	Building long-term relationships based on established guidelines	4.65	5	0.48
d	Shared clear vision for supply chain management	4.65	5	0.48
e	Use of the concept of "Just in Time"/as a tool to increase competitiveness	4.82	5	0.38
f	Exchange of production information on an ongoing basis, For example, through sales and operations planning meetings	4.00	4	0.91
g	Joint introduction of benchmarking and performance indicators	4.24	4	0.73
h	Standardization of quality policies for both products and processes with established guidelines	4.82	5	0.38
i	Tailored product strategies, supply and distribution with supply chain strategy	4.82	5	0.38
j	Providing information on customer requirements and project plans	4.47	5	1.14
k	Using supply chain concepts in product, process and packaging design	4.24	4	0.73
l	Common procedures for obtaining feedback from customers who are involved in product development	4.65	5	0.48
ł	SC competitiveness	4.47	5	0.78

Source: Own compilation based on survey.

The most important business elements of sustainability used by the surveyed companies included those in the form of the use of the "JIT" concept as a tool to increase competitiveness, the standardization of quality policies, both for products and processes, and the alignment of product strategies. On the other hand, the lowest rated elements were the ongoing exchange of production information through sales and operations planning meetings, the joint introduction of benchmarking and performance indicators, and the use of supply chain concepts in product, process and packaging design.

Table 5 How important are the following environmental sustainability elements used by you affecting SCM?

1 = Not important, 2 = Slighlty important, 3 = Neutral, 4 = Important, 5 = Very Important.		**average**	**median**	**St. Dev.**
a	Environmentally friendly manufacturing processes	4.12	4	0.32
b	Measures to reduce waste	4.65	5	0.48
c	Commitment to emission-free manufacturing processes	4.65	5	0.48
d	Use of renewable energy sources in production	4.82	5	0.38
e	Sustainable waste processing	4.82	5	0.38
f	Selection of supply chain partners based on environmental guidelines	4.18	4	0.78
g	Employee involvement in environmental programs	3.94	4	1.16
h	Application of reverse logistics solutions in SC	4.18	4	0.78

Source: Own compilation based on survey.

On the other hand, among the most important environmental elements of sustainability, companies ranked the use of RES in production processes and sustainable waste processing. In contrast, employee involvement in environmental programs was rated very low.

Table 6 How important are the following social sustainability elements used by you affecting SCM?

1 = Not important, 2 = Slighlty important, 3 = Neutral, 4 = Important, 5 = Very Important.		**average**	**median**	**St. Dev.**
a	Application of the code of ethical conduct to employees and contractors	4.59	5	0.49
b	Applying fair employment policies to the local community	4.59	5	0.49
c	Provision of equipment to ensure hygiene and safety at work	4.82	5	0.38
d	Investments in public infrastructure facilities	4.18	4	0.78
e	Timely and lawful payment of taxes and fees due	4.82	5	0.38
f	Transparency of the income on which taxes are based	4.82	5	0.38
g	Application of ethical standards of business and commerce	4.82	5	0.38
h	Investment in poverty reduction programs	4.18	5	0.98
i	Participation in charitable actions of the local community	4.47	5	0.78
j	Participation in regional and supra-regional development initiatives	4.00	4	0.91
k	Participation of the company through the SC in environmental and/or public space activities	4.41	4	0.49

Source: Own compilation based on survey.

With regard to the social elements of sustainability, the highest ratings were given to the provision of equipment to ensure occupational health and safety, the timely and legal payment of taxes and fees due, the transparency of income on which taxes are based, and the application of business and trade ethical standards. The lowest rating was given to the company's participation in regional and supra-regional development initiatives.

Table 7 How important are the following impediments to the implementation of the SCM?

1 = Not important, 2 = Slighlty important, 3 = Neutral, 4 = Important, 5 = Very Important.		**average**	**median**	**St. dev.**
a	Lack of understanding of the goals and ideas of SCM among employees	4.41	4	0.49
b	Workers' resistance to the implementation of changes related to the SCM	4.24	4	0.73
c	Organizational structure that hinders information sharing	4.47	5	0.78
d	Problems with the quality of operations caused by members of the supply chain	4.47	5	0.78
e	Communication problems and confidential data	4.47	5	0.78
f	Laws and regulations hindering relationships within the SCM	4.24	4	0.73
g	Some members of the supply chain do not support the concept of SCM	4.47	5	0.78

Source: Own compilation based on survey.

Analyzing, on the other hand, the impediments that enterprises face in the way of realizing GCC, the most significant was considered to be the fact of having an organizational structure that makes it difficult to exchange information, the existence of problems with the quality of activities caused by individual members of the supply chain, communication and confidentiality of data, and the fact that some members of the supply chain do not support the concept of GCC. On the other hand, the least significant impediment was considered to be the resistance of employees to the implementation of changes related to GCC, and that current laws and regulations hinder GCC relationships.

Table 8 details the correlations between all the variables in the above tables and the number of employees, years of operation and type of enterprise. A detailed description has been created under the table, which interprets the results obtained.

Table 8 Correlations

	Number of employees	Years in business	Type of enterprise
[Increased competition]	0.132410	0.553283	-0.018227
[End customer needs]			
[Supply chain process integration]	0.166070	0.104090	0.560082
[Cooperation of supply chain members/links]	0.617914	0.387298	0.637947
[Cost reduction]	-0.229380	0.044237	0.196740
[Process improvement and productivity improvement].	0.626783	1.000000	-0.352966
[Internal inter-functional cooperation]	0.626783	1.000000	-0.352966
[Collaboration in inventory and logistics management].	1.000000	0.626783	0.394197
[Use of information technology to increase communication efficiency].	-0.037398	-0.023440	0.486490
[Building long-term relationships based on established guidelines].	1.000000	0.626783	0.394197
[Shared clear vision for supply chain management].	1.000000	0.626783	0.394197
[Use of "Just in Time"/as a tool to increase competitiveness].	0.626783	-0.214286	0.847117
[Sharing production information on an ongoing basis, such as through sales and operations planning meetings].	0.406921	0.510102	0.336090
[Joint introduction of benchmarking and performance indicators].	0.743925	0.783349	0.245774
[Standardization of quality policies for both products and proceow sz established guidelines].	0.626783	-0.214286	0.847117
[Tailored product strategies, delivery and distribution in line with supply chain strategy].	0.626783	1.000000	-0.352966
[Providing information on customer requirements and project plans].	0.626783	1.000000	-0.352966
[Using supply chain concepts in product, process and packaging design].	0.743925	0.783349	0.245774
[Common procedures for obtaining feedback from customers who are involved in product development].	1.000000	0.626783	0.394197
[S.C. competitiveness]	0.923823	0.877328	0.069365
[Environmentally friendly production processes]	0.269680	0.169031	0.278423
[Waste reduction activities]	1.000000	0.626783	0.394197
[Commitment to emission-free production processes].	1.000000	0.626783	0.394197
[Use of renewable energy sources in production].	0.626783	1.000000	-0.352966
[Sustainable waste processing].	0.626783	1.000000	-0.352966
[Selection of supply chain partners based on environmental guidelines].	0.166070	0.104090	0.560082
[Employee involvement in environmental programs].	-0.037398	-0.023440	0.486490
[Application of reverse logistics solutions in SC].	0.166070	0.104090	0.560082
[Application of a code of ethical conduct to employees and contractors].	0.132410	0.553283	-0.018227
[Use of fair employment policies of the local community].	0.132410	0.553283	-0.018227
[Providing equipment to ensure occupational health and safety].	0.626783	1.000000	-0.352966
[Investment in public infrastructure facilities].	0.166070	0.104090	0.560082
[Timely and lawful payment of taxes and fees due].	0.626783	1.000000	-0.352966
[Transparency of the revenue underlying the tax calculation].	0.626783	1.000000	-0.352966
[Application of ethical standards of business and commerce].	0.626783	1.000000	-0.352966
[Investment in poverty reduction programs]	0.132410	0.553283	-0.018227
[Participation in charitable actions of the local community].	0.923823	0.877328	0.069365
[Participation in regional and supra-regional development initiatives].	0.406921	0.510102	0.336090
[Company's participation through SC in environmental and/or public space activities].	0.617914	0.387298	0.637947
[Lack of understanding of the goals and ideas of SCM among employees].	0.617914	0.387298	0.637947
[Employee resistance to the implementation of changes related to SCM].	0.743925	0.783349	0.245774
[Organizational structure that hinders information sharing].	0.923823	0.280745	0.658971
[Problems with the quality of operations caused by members of the supply chain].	0.923823	0.280745	0.658971
[Communication problems and confidential data].	0.923823	0.280745	0.658971
[Laws and regulations hindering relationships under the SCM].	0.743925	0.149209	0.872497
[Some members of the supply chain do not support the concept of SCM].	0.923823	0.280745	0.658971

Source: Own compilation based on survey.

Interpreting the results of the correlation analyses carried out, first of all, it can be pointed out that there are a number of statistically significant correlations between the size of the company, age, and business profile and the selected areas of SCM and SSCM. Analyzing the importance of the determinants of SCM in terms of their influence on the application of the concept in practice, it can be concluded that there are statistically significant correlations between:

- between the size of the enterprise and the cooperation of supply chain members/cells (r=0.61), process improvement and productivity improvement (r=0.63), and internal inter-functional cooperation (r=0.63);
- between company age and increased competition (r=0.55), process improvement and productivity improvement (r=1.00), and internal inter-functional cooperation (r=1.00). With correlation values for the last two elements indicating very strong relationships;
- between business profile and supply chain process integration (r=0.56) and collaboration of supply chain members/cells (r=0.64).

In the area of business elements of sustainability, the correlation analyses conducted confirmed the existence of significantly statistical relationships between:

- company size and cooperation in inventory and logistics management (r=1.00), building long-term relationships based on established guidelines (r=1.00), sharing a clear vision for supply chain management (r=1.00), using the "Just in Time" concept as a tool to increase competitiveness (r=0.63), jointly introducing benchmarking and performance indicators (r=0.74), standardizing quality policies for both products and processes with established guidelines (r=0.63), alignment of product strategies, supply and distribution in line with supply chain strategy (r=0.63), sharing information on customer requirements and project plans (r=0.63), use of supply chain concepts in product, process and packaging design (r=0.74), joint procedures for obtaining feedback from customers who are involved in product development (r=1.00), and competitiveness of SC (r=0.92).
- age of the company vs. collaboration on inventory and logistics management (r=0.63), building long-term relationships based on established guidelines (r=0.63), sharing a clear vision of supply chain management (r=0.63), sharing production information on an ongoing basis, e.g. through sales and operations planning meetings (r=0.51), joint introduction of benchmarking and performance indicators (r=0.78), alignment of product strategies, supply and distribution in line with supply chain strategy (r=1.00), sharing information on customer requirements and project plans (r=1.00), use of supply chain concepts in product, process and packaging design (r=0.78), common procedures for obtaining feedback from customers who are involved in product development (r=0.63), and competitiveness of S.C. (r=0.88).
- between the business profile and the use of information technology to increase communication efficiency (r=0.49), the use of the "Just in Time" concept as a tool to increase competitiveness (r=0.85), the standardization of quality policies for both products and processes with established guidelines (r=0.85).

In the area of environmental elements of sustainability, correlation analyses conducted confirmed the existence of significantly statistical relationships between:

- company size and waste reduction efforts (r=1.00), commitment to emission-free production processes (r=1.00), use of renewable energy sources in production (r=0.63), and sustainable waste processing (r=0.63).
- between company age and waste reduction efforts (r=0.63), commitment to emission-free production processes (r=0.63), use of renewable energy sources in production (r=1.00), and sustainable waste processing (r=1.00).
- between business profile and the selection of supply chain partners based on environmental guidelines (r=0.56), employee involvement in environmental programs (r=0.49), and the use of reverse logistics solutions in SC (r=0.56).

In the area of social elements of sustainability, correlation analyses conducted confirmed the existence of significantly statistical relationships between:

- the size of the enterprise and the provision of equipment to ensure occupational health and safety (r=0.63), the timely and legal payment of taxes and fees due (r=0.63), the transparency of income on which taxes are based (r=0.63), the application of ethical standards of business and commerce (r=0.63), participation in charitable actions of the local community (r=0.92), and the participation of the enterprise through SC in activities for the environment and/or public space (r=0.62).
- the age of the enterprise and the application of a code of ethical conduct towards employees and contractors (r=0.55)), the application of fair employment policies to the local community (r=0.55), the provision of equipment to ensure occupational health and safety (r=1.00), the timely and legal payment of taxes and fees due (r=1, 00), transparency of income on which taxes are based (r=1.00), adherence to ethical standards of business and commerce (r=1.00), investment in poverty reduction programs (0.55)), participation in charitable actions of the local community (r=0.88), and participation in regional and supra-regional development initiatives (r=0.51).
- between the business profile and investment in public infrastructure facilities (r=0.56), and the company's participation through SC in environmental and/or public space activities (r=0.64).

On the other hand, with regard to impediments, the following significantly statistical relationships were identified between:

- company size and employees' lack of understanding of the goals and ideas of SCM (r=0.62), employees' resistance to SCM-related changes (r=0.74), organizational structure hindering information sharing (r=0.92), problems with the quality of activities caused by supply chain

members (r=0.92), communication problems and confidential data (r=0.92), laws and regulations hindering SCM relationships (r=0.74), and that some supply chain members do not support the concept of SCM (r=0.92).

- Between the age of the company and employees' resistance to implementing changes related to SCM (r=0.78),

- between the business profile and employees' lack of understanding of the goals and ideas of SCM (r=0.64), organizational structure hindering information sharing (r=0.66), problems with the quality of operations caused by supply chain members (r=0.66), communication problems and confidential data (r=0.66), laws and regulations hindering SCM relationships (r=0.87), and that some supply chain members do not support the SCM concept (r=0.66).

In conclusion, it can be said that there are significant statistical relationships between almost all aspects of SCM and size, years of operation and business profile. Only depending on the selected criterion (age, years and business profile) can the number of these correlations vary. In addition, it should be noted that the prevailing value of the identified correlations exceeds values of 0.6, which means that the correlations that occur are strong correlations. Therefore, it can be assumed that the formation of the SCM of enterprises significantly depends on the size, years of operation in the market and profile of the enterprises. It is also worth mentioning that only in the case of environmentally friendly production processes and end customer needs, no statistically significant correlations were shown. On the other hand, the greatest number of statistically significant correlations were shown in the area of impediments to the introduction of SCM - especially with regard to the size and business profile of enterprises.

4 Conclusions

Summarizing the research, it can be said that all the companies surveyed declared that the greatest influence on the application of supply chain management concepts in practice is the needs of the end customer. Slightly less influence, on the other hand, is attributed to internal inter-functional cooperation and process improvement and productivity improvement. In contrast, the least impact was attributed to cost reduction and the process of integrating supply chain processes. Thus, it can be acknowledged that all of the meat companies surveyed place a very high value on end-customer satisfaction through smart supply chain management.

The objectives of the article were achieved by assessing the level of sustainable supply chain management in the meat industry. The results of the study relating to sustainable supply chain management allow us to conclude that the surveyed companies indicated both very important and important elements in each business, environmental and social aspect, while nowhere were there answers of little or no importance.

Thus, the most important business elements of sustainable development were: use of the "JIT" concept, standardization of quality policy and alignment of product strategy. The lowest rated elements were the ongoing exchange of production information through planning, sales and operations meetings, and the use of information technology to increase communication efficiency.

The environmental elements of sustainability with the highest average were: use of RES and waste treatment in accordance with the principles of SD. The lowest rated elements were environmentally friendly production processes, employee involvement in environmental programs, and selection of supply chain partners based on environmental guidelines.

The surveyed group of meat companies declared that all the social SD elements indicated in the survey were important or very important. The highest rated elements were those related to the company's attitude to Polish law, in particular the timely payment of taxes and fees due and the transparency of income on which taxes are based. Also highly rated were the application of ethical standards of business and commerce and the provision of equipment to ensure hygiene and occupational safety.

Undoubtedly, companies in the meat industry pay very close attention to the satisfaction of the end customer. As well as paying attention to the overall external image of the company as perceived by third parties and individuals.

Meat companies also indicate that process improvement and productivity improvements do not significantly affect the application of supply chain management concepts in practice. Improved processes allow the use of newer technology, which would make the flow of goods and information faster, more resilient in the event of disruptions and make supply chain management easier and less exposed to potential undesirable risks or hazards.

Sustainable development presupposes such development that, while meeting the needs of today's societies, does not at the same time limit the development opportunities of future generations, so it is alarming that the meat companies surveyed do not want to develop information technology to increase the efficiency of communication. Fast and seamless communication between members of the supply chain or the company's internal departments themselves allows for the streamlining of many processes resulting in greater satisfaction of the final customer, thanks to the faster arrival of meat products in his hands.

Today's society pays a lot of attention to caring for the environment, so when choosing products from store shelves they are interested in the origin of meat products, the way they are processed and prepared. Therefore, when hearing that a meat company does not use environmentally friendly production processes they will be more discouraged from buying their products.

Based on the characteristics of the research population, suggestions for further research can be made. One

fundamental suggestion is to increase the scope of the research conducted, so that a larger group of enterprises will participate in the survey, and the resulting sample will be representative which would provide an overview of sustainable supply chain management in the meat industry nationwide.

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