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Green Supply Chain Management Evaluation for Organic Products: Theoretical and Empirical Point of View

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ABSTRACT

This study deals with the green supply chain evaluation for organic products. The authors present the development of the market for such products and the latest trends in world markets in connection with the creation and implementation of a new business strategy relating to the implementation of environmental aspects. The aim of the discussion is to indicate the theoretical basis for the construction of the green supply chain, with particular emphasis on the specificity of organic products. Theoretical considerations are accompanied by the results of empirical research, which indicate in which areas and in the scope of implementation of which management tools there are significant differences between enterprises and what may be the reasons for this. The novelty and value of this study lie in the reference to the principles and elements of the green chain to ecological products and the indication why a holistic approach to environmental protection should be promoted (i.e., production and the whole supply chain promoting the principles of sustainable development). The analysis of literature, methods of descriptive and mathematical statistics and ANOVA (analysis of variance) have been used in this study.

Keywords: *green supply chain management, ANOVA, evaluation, indicators, organic products.*

1. INTRODUCTION

The analysis of organic agricultural production shows that it has gained importance in recent years. Empirical studies indicate (Willer & Lernoud, 2019) that more than 180 countries have already undertaken it and the organic production area has increased by 20 per cent in the last three years. This clearly demonstrates the high level of interest on both the supply and the demand side. As a consequence of the measures taken in the area of production and organic farming, a need to create and evaluate the functioning of green supply chains emerged. Achieving environmental objectives is linked to the necessity to improve environmental practices, and this is linked to the growing interest in introducing environmental aspects into supply chains and developing a new strategy for managing the green supply chain. There is a need to integrate green practices and principles into supply chain strategies (Morali & Searcy, 2013). This applies to both logistics and business processes, to products themselves, and to initiatives at the level of the whole chain.

The implementation of the green supply chain strategy and its management is possible with the use of many activities. The most frequently used approaches include recycling, reverse logistics, supplier selection using ecological criteria, green planning (design), the use of advanced technologies as well as appropriate scientific instruments, measures, and indicators to measure the greening of the chain (Hsu *et al*., 2016; Carter & Rogers, 2008; Zhu *et al*., 2008). Taking such actions is particularly important, especially in a situation where core business is on organic production. The purpose and aim of the following considerations is to indicate, on the basis of carried out empirical research and created framework, whether and to what extent organic production companies use management tools to assess their supply chains' environmental performance. At the same time, the considerations are limited and contribute to the scientific discussion in order to propose a set of dedicated assessment tools for organic agricultural supply chains. A novelty is indication, on the basis of empirical studies, the differences in the perception of the proposed solutions by organisations, which include organic agricultural production as basic types of their activities. The theoretical part may serve as a basis for the construction of a model of the green supply chain for the indicated products, taking that not all the activities will be included. The indicated statistical methods were used to assess the differences between the units.

The paper is structured as follows: Section 2 includes research questions and research gaps; Section 3 briefly discusses the theoretical aspects of the considerations focusing on trends and developments in organic production worldwide and the theoretical basis for the construction of a green supply chain for this type of product. Since green supply chain management is already a commonly used strategy, the authors focused on the construction of a theoretical framework indicating the possibilities and methods of its evaluation, including the description of methods, techniques, indicators and measures used. Section 4 is an empirical part, which presents the methodology of research undertaken, descriptive and statistical analysis, using the ANOVA method. The section ends with the interpretation and summary of the research, with the indication of the subsequent stages, which will be undertaken by the authors. Section 5 is limitation and discussion, in which changes and ways of re-modelling the green supply chain will be proposed. This section shows the way and possibilities of using dedicated tools to assess its greening. The reasons for choosing both methods and research units will also be identified, and the issue whether such solutions can be used for short food supply chains, which are not always organic will be addressed. The considerations are summarised in section 6.

2. RESEARCH GAPS AND QUESTIONS

The basic research gaps identified by the authors on the basis of the literature: (1) the existing theoretical framework for GSCM is very general and often fails to take into account product specificities that have a huge impact on the chain itself as well as on consumer perception of the product including the product, (2) the multiplicity of research instruments and tools used may lead to an excessive scattering of methods and a lack of clarity in defining and interpreting the actions to be taken, (3) the overly mathematised nature of GSCM in the literature does not support economic practice (both on the demand and the supply side) to undertake good practices and actions aimed at introducing green principles into supply chain strategies. Research gaps largely relate to the theoretical aspect, while research questions relate to empirical research. At this point, the authors consider whether there are differences in the perception and approach to methods and approaches of evaluating the green supply chain, taking into account the size of companies, specificity of production, different aspects and ways of greening the chain, as well as dedicated evaluation tools.

3. THEORETICAL BACKGROUND

3.1 *Organic Production in The World – Trends and Directions of Development*

The analysis of global agriculture clearly show that it is not sustainable. In fact, most agricultural products are available worldwide, thanks to complex, often highly industrialised, supply networks (UBA, 2018). Global supply networks for agricultural products are not transparent, they are often not dependent on chemicals and GMOs. Both conventional production and conventional supply chains contribute to a significant negative impact on the environment. Deteriorating soil and water quality contributes to the low quality of agricultural products and long supply chains and logistics processes further damage the environment. It can be shown that the objective of producing sufficient food for a growing human population has been achieved, but that negative consequences and impacts on the environment and high external costs are not taken into account (Joseph *et al.*, 2019) along with the necessary balancing costs to protect the life and health of present and future generations. And organic farming can play a key role in feeding a growing human population in a sustainable way (Muller *et al.*, 2017). Redesigning the agricultural production system is a very complex challenge and process, depending on many socio-economic and technological factors.

It goes without saying that the growing awareness of consumers, together with an increase in demand for sustainable development and food and the provision of healthy products, are measures which aim to achieve the objective of being able to supply food to an ever-increasing number of people, while minimising the global impact on the environment (Seufert *et al*., 2012; Joseph *et al*., 2019). Organic farming supported by green supply chains might be crucial in this regard.

The most recent global research on organic agricultural production was presented in 2019. It relates to production all over the world. Both legal and institutional regulations concerning organic production depend on the region of the world. Individual regions, successively, within the framework of either Community measures or internal regulations, introduce regulations concerning the production, trade, monitoring and labelling of organic products.

The European Union recognises that organic farming can make a significant contribution to the sustainable development of agriculture (Cock *et al*., 2016). The measures taken by the European Union offer the possibility of a very flexible approach to the subject, and although most EU Member States declare and own land and organic production, the conditions, methods, and size of this type of agriculture vary considerably between Member States.

Differences in both the size and extent of implementation of organic production are huge. They include the use of direct supply instruments, the availability of which has a significant impact on the number and producers but also on the agricultural area (Daugbjerg *et al*., 2011). Joseph et. al 2019 points out that the viability of organic farming depends on yields, but also on labour and production costs, farmers' production capacity and the potential cost savings associated with reducing the costs associated with the use of non-renewable resources and the chemical means of production purchased (Reganold & Wachter, 2016).

Significantly better results and a huge increase in the efficiency of organic production can be observed when the state policy in this area supports both the supply side and the consumers' encouragement (Daugbjerg, 2011). Organic agricultural production is strongly influenced by the consumer, the transition to organic practices must be linked to the roar and the willingness of consumers to buy such products. Personal characteristics of consumers, including attitudes, mentality, culture, risk aversion, amount of resources at their disposal, size and type of household and social factors, including the opinions of social groups to which the consumer belongs, influence their decisions, including considering the purchase of organic products. At the same time, it can be pointed out that similar characteristics accompany farmers, including the fact that there are still positive incentives for farmers, from decision-makers and general policies to address such challenges and to address the concerns and risks associated with organic farming.

Organic production can be defined as a broad system that (IFOAM, 2018):

- Sustains the health of soils, ecosystems, and people;
- Relies on ecological processes, biodiversity, and natural cycles adapted to local conditions, rather than synthetic pesticides, herbicides, and fertilizers;
- Combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and quality of life for all involved.

The characteristic feature of organic farming is its certification. The information on the packaging shall indicate whether the production or processing took place in accordance with accepted organic standards (Seufert & Ramankutty, 2017).

Organic production in most cases yields less, but balances sustainability objectives and contributes increasingly to global food security (Lernoud & Willer, 2019). Ponisio *et al*., 2015 on the basis of studies indicates that the yields of organic production are 19.2% lower than those of conventional production. However, this is not always the case, as yields are affected by many different factors, ranging from the characteristics of the land, the type and conditions of cultivation and management practices. Some climatic changes (e.g. increasing or decreasing rainfall in some regions) affect the high water retention capacity of clays, which may consequently lead to higher organic than conventional production (Reganold & Wachter, 2016).

There is no doubt, however, that organic farming is more environmentally friendly than conventional agricultural production. This is due to the fact that soil protection is promoted and the use of harmful and chemical substances is restricted, including reduced nutrient emissions, and enhanced biodiversity (Joseph *et al.*, 2019).

Analyzing the latest data (Lernoud & Willer, 2019) concerning organic agricultural production, it should be noted that in 2017, 69,8 million ha were under organic agricultural management worldwide. However, this represents only 1.4% of the World's farmland. This production is introduced by 181 countries, and 2.9 million farmers are involved, representing a 4.7% increase compared to 2016. It is estimated that the value of the market for this type of products is 92 trillion euros, clearly indicating that consumer demand is still growing. Cultivated area and the largest countries and markets are shown in **Table 1**.

Table 1 Basic data for organic farming 2017

Organic Farmland 2017		**Countries (land in million of hectares)**		**Number of producers**	
Continent	area (ha)				
Australia and Oceania	35,9	Australia	35,6	India	835000
Europe	14,6	Argentina	3,4	Uganda	210352
Latin America	8	China	3,0	Mexico	210000
Asia	6,1	Spain	2,1	Ethiopia	203602
North America	3,2	USA	2,0	Philippines	166001
Africa	2,1	Italy	1,9	Tanzania	148610
market in billion euros		**Share of total agri. Land (%)**		**distribution of retail sales value by region 2017 [%]**	
USA	40	World	1,4	North America	47
Germany	10	Africa	0,2	Europe	41
France	7,9	Asia	0,4	Asia	10
China	7,6	Europe	2,9	Oceania	1
Italy	3,1	Latin America	1,1	Latin America	0,9
Canada	3,0	North America	0,8		
Switzerland	2,4	Oceania	8,5		

Source: adapted from Lernoud and Willer (2019)

When interpreting the data from **Table 1**, it should be pointed out that the largest areas are owned by Australia, then by Europe. The largest market growth was recorded by France 18%, market share, i.e., 13.3% of Switzerland has highest per capita consumption - 288 Euros., Denmark - 278, Sweden 237 Euros. The largest single market is the USA, followed by the EU and China. An interesting fact, interpreting data from the market of organic agricultural production, is that over 84% of producers of such food are located in Asia, Africa and Latin America.

The presented statistics indicate a significant development of the organic production market. However, this is a small percentage in relation to conventional production. On the one hand, it may show the marginal significance of the undertakings, but on the other hand, since it is a developing market, it is possible to introduce the principles of sustainable development and green supply chain strategy for the whole supply chain of such products more quickly and easily.

3.2 Green Supply Chain for Organic Products - Conceptual Framework

World literature analysis indicates that the green supply chain is defined as an extension of the traditional supply chain to reduce the environmental impact of a product throughout its life cycle (Beamon, 1999). The implementation of the strategy highlights environmental aspects and the implementation of measures to reduce the negative impact of the environmental impact of the process chain. Understanding the essence of the green chain consists in implementing a new way of thinking, in which all activities and processes carried out so far will, on the one hand be subordinated to the standard objectives of the chain, and on the other hand they will meet environmental objectives (environmental protection and resource protection, as well as the use of environmentally neutral technologies to manage the entire supply chain as much as possible). The aim is to integrate and recognise environmental (including environmental) aspects as an integral part of supply chain management as an appropriate standard. It can be pointed out that this is a new, additional objective of the chain activity, i.e. - costs, quality, time, and environment, which should be understood as protection and "greening" of processes. Consequently, the supply chain is linked and supported by an efficiently implemented environmental management system, supported by environmental certification and the recognition of environmental protection elements as one of the objectives of the activity (Tundys, 2018).

Introducing aspects of greening requires the redefinition of business processes, thus changing not so much the elements that make up the chain as the rules that govern it. This calls for the introduction of new processes, activities and tools for evaluating the functioning. The attitudes of this chain are based on traditional solutions, emphasized within the framework of the environmental protection activity. Due to the fact that organic production requires compliance with stricter regulations concerning not only the product itself, but also often the packaging, creating and evaluating the green supply chain for organic products should be introduced into its framework pro-environmental principles at each stage. In such solutions, the most important element will be the environment and the fulfilment of objectives: economic, qualitative, and temporal, taking into account the impact of the entire chain on the environment and the principles and standards adopted for organic production. Therefore, while designing and implementing organic agriculture, it is worth taking care of its supply chain, both in the context of e.g., choosing a supplier and its compliance with environmental rules, as well as the implementation of distribution processes to final consumers. It is necessary to construct the chain in such a way that processes, products, and services will have the least negative impact on the natural environment. As a consequence, it is, to the greatest extent possible, "greening" of processes.

Conceptual framework allows to identify individual elements constituting the components of the chain, but also to identify and identify components characteristic for the green supply chain. Green supply chain a conceptual framework is presented in the **Figure 1**.

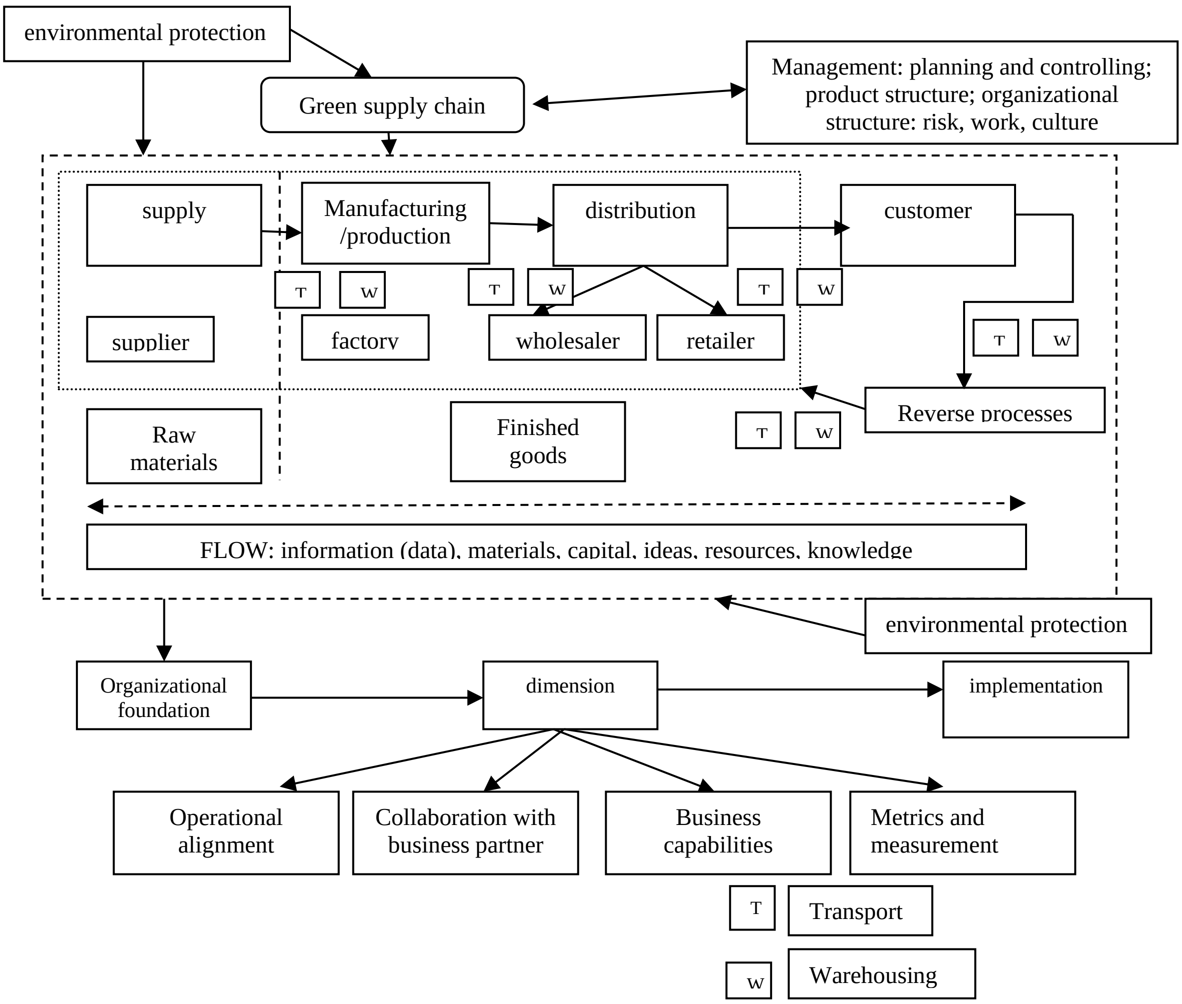

Figure 1 Green supply chain – conceptual framework

The specificity of organic products can be added through further development of the organic supply chain as shown in **Figure 2**. Green supply chain for organic products a conceptual framework is presented in the **Figure 2**. The green supply chain for organic products must include, in addition to standard processes, a high level of environmental care, including consideration of reverse processes. In fact, every activity and every process must comply with the principles of environmental care. Strategies, resources, instruments, and methods must be taken into account when building the concept with the specific background.

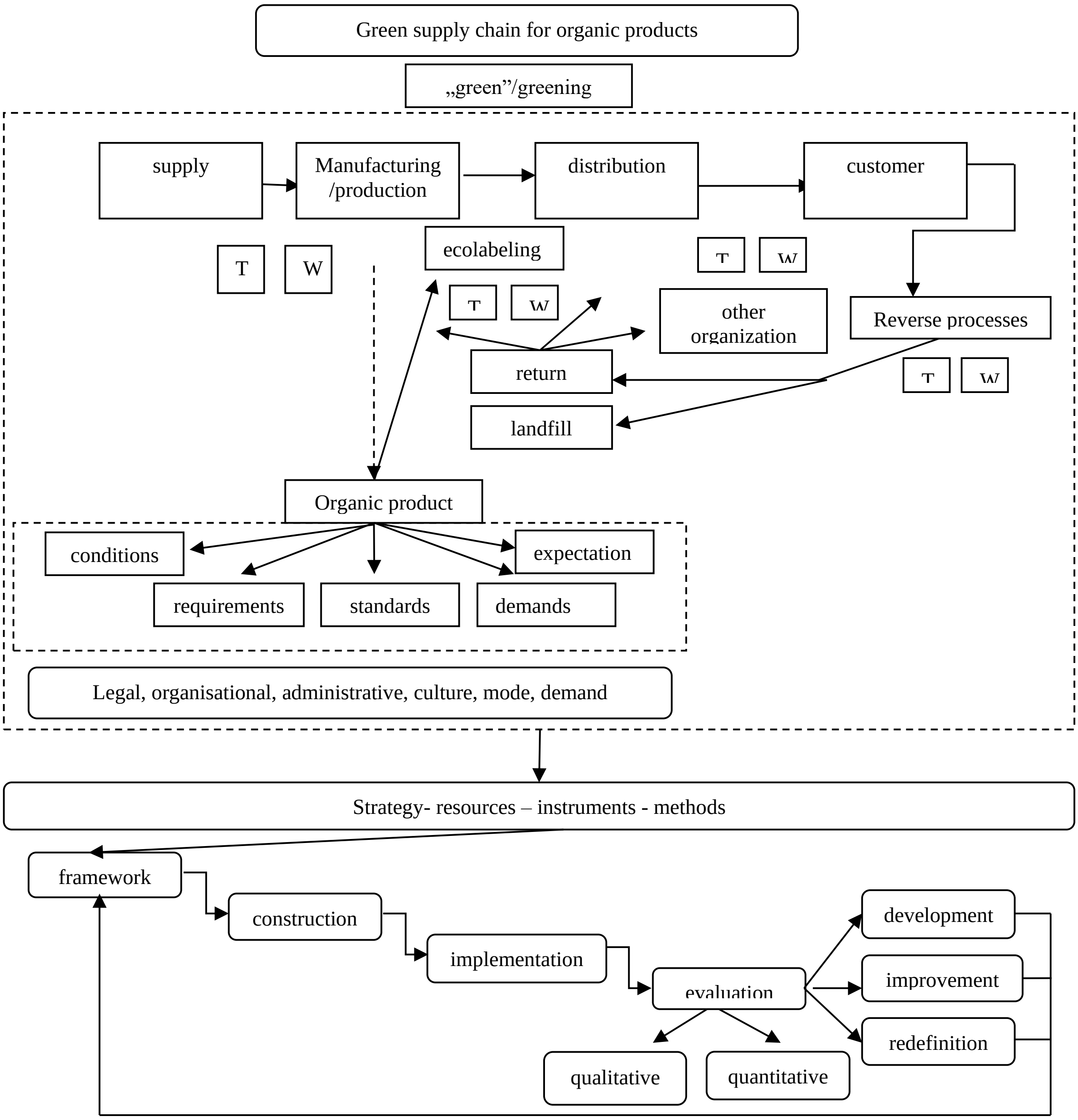

Figure 2 Green supply chain for organic products – conceptual framework – evaluation and improvement approach

The proposed conceptual frameworks indicate the need to pay attention to environmental aspects in construction, implementation, and evaluation. In addition, the green supply chain for organic products includes the requirements for both the product itself and its packaging. These chains can be evaluated using qualitative and quantitative tools as well as descriptive and mathematical and statistical analysis.

4. ANALYSIS OF EMPIRICAL RESEARCH

4.1 *Data Collection and Research Process*

Empirical studies were conducted using a survey method with a questionnaire [Lydeard, 1995]. It contained both open and closed-ended questions, which were used for quantitative and qualitative research. The questionnaire was prepared on the basis of an in-depth literature analysis, interviews with experts and a scientific discussion. The questions were developed on the basis of the identified research areas and pre-formulated hypotheses. The selected research sample (the research covered more entities with its scope and scope, only one group of the surveyed organisations was taken into consideration) was made up of 112 enterprises, of which 42 were large (employing over 250 people) and 70 medium-sized organizations. The selected entities were producers or processors of organic food products operating in Poland. The presented research results are part of a larger project, which included research on the green supply chain and methods of its evaluation, with the use of management tools. Companies from various industries were selected for the survey, including entrepreneurs and manufactures of organic food. The questionnaire was divided into several parts, including a general one, allowing to obtain information on knowledge, methods and elements of the green supply chain with the determination of the degree of greening of one's chain. The next one related to the use of methods and tools for managing the functioning of the green supply chain, and how it could be assessed using specific instruments. The last part dealt with process elements and identified issues related to the management and evaluation of the green supply chain in terms of specific and specific supply chain processes.

4.2 Descriptive Analysis

Overall research results on aspects of the green supply chain for organic food producers and processors show that only 21% of them assess the supply chain they operate in from the point of view of environmental performance. Very important information is that more than 53% of the respondents in this research group have environmental certificates (e.g., ISO 14001). Using the Likert scale, respondents were asked about the use of environmental aspects within the activity (e.g., environmental aspects of supplier selection, ecological packaging, transport). It turns out that 50% of the respondents do not pay attention to it, 16.7% sometimes, and 33.3% often or always. Analysing data on the use of environmental performance aspects (including the effectiveness of actions taken and increasing efficiency in this area), 32.2% of respondents indicated that they do not use them, 16.1% use sometimes, and as much as 51.5% use them often or always. Respondents were also asked about their knowledge of green supply chain principles, design and definition. 26.5% replied that their knowledge was low, 28.1 that was average and 45.3% that they had a good knowledge of the subject. Of the respondents 62.8% indicated that they are implementing green supply chain principles, 65.7% that they are implementing recycling logistics and 52.8% that they are implementing green logistics in their organizations. Unfortunately, when interpreting the results, it can be stated that, although manufacturers of ecological products were surveyed in terms of the wider supply chain approach, not everyone understands the essence of the chain or has knowledge about it, often environmental aspects are not taken into account when assessing their activity or selecting suppliers. Organisations were also asked how they study and analyse the environmental impact of their activities. Analysis of the impact of the organizational activity of producers on the natural environment is presented in the **Table 3**.

Table 3 Analysis of the impact of the organizational activity of producers on the natural environment

Analysis of the impact of the organizational activity of producers on the natural environment	% of respondents
Environmental performance indicator of deliveries	49.83
LCA - product life cycle	1.43
Share of recycled materials in total materials used	37.71
Share of ecological vehicles in the total fleet	50.25
Share of ecological packaging in total packaging	8.63
Carbon footprint test	33.67
CSR	7.85
Number of suppliers with environmental certificates	1.60
Ecological audits	20.84
Management tools (e.g. sustainable scorecard)	86.71
Ecological QFD	78.79

When interpreting selected methods and the element of environmental assessment of the supply chain (**Table 4**), it should be pointed out that organizations do not have internal regulations or do not use them in this respect.

Table 4 Use of selected methods and techniques to assess the supply chain (environmental aspect) of organic products

Evaluation of the supply chain from an environmental point of view	never/rarely	sometimes	often/always
ISO 14001	17.66	24.80	57.54
Eco-efficiency measures and indicators	43.08	25.31	31.61

Table 4 Use of selected methods and techniques to assess the supply chain (environmental aspect) of organic products (cont')

Evaluation of the supply chain from an environmental point of view	never/rarely	sometimes	often/always
LCA - Product Life Cycle Assessment	38.32	21.60	40.08
Assessment of the carbon footprint	17.53	27.43	55.04
Assessment of the water footprint	25.50	27.24	47.26
Supplier certification tools (environmental)	26.66	27.32	46.02
Environmental regulations (inside the organization and within the chain)	66.51	19.64	13.85
Environmental management system	22.52	48.18	29.30
Environmental methods of supplier selection	46.31	29.35	24.34
Environmental methods of selecting business partners	22.61	30.68	46.72
Green purchases (supplies)	55.83	10.34	33.83
Packaging (environmental) assessment tools	55.30	3.98	40.72
Life cycle cost (LCC)	15.20	29.34	55.45
EU environmental directives and regulations	37.18	15.38	47.44
Sustainable development instruments and tools	47.65	32.80	19.55

4.3 Statistical Analysis

The ANOVA method was selected for statistical analysis. Analysis of variance-ANOVA was used to examine the significance of differences examine the significance of differences between entrepreneurs who implemented and did not implement the green supply chain (Tundys & Wiśniewski, 2018). The size of the organisation has also been taken into account, as these are elements that can have a significant impact on the outcome of the research. Account has been taken of the companies that have declared and indicated in the activity that they are engaged in the production or processing of organic food products. The research is based on the Research and is accompanied by detailed hypotheses. The results of the research are presented in **Table 5**.

Table 5 Organic food manufacturing - aspects - ANOVA

Organic food manufacturing		green supply chain			
		middle size		large	
		p -Value	F	p- Value	F
1	environmental aspect	0.09341	3.886996	0.503818	3.977779
2	KPI	0.010949	3.884271	0.950885	4.023017
3	cost-effectiveness	0.002642	3.884271	0.775405	4.078546
4	revenue efficiency	0.082898	3.884271	0.765558	3.977779
5	innovativeness	0.006631	4.0471	0.575115	3.949321
6	time aspect	0.079566	3.884271	0.027026	4.844336
7	quality aspect	0.741192	3.884271	0.71298	3.977779
8	the cost aspect	0.002655	3.884271	0.479632	3.977779

Significant differences exist in most cases of medium-sized enterprises. In this respect, they relate to use: KPIs for cost effectiveness, innovation, and cost aspect, for large enterprises, differences only exist in terms of time aspect. Among other factors, there are no significant differences between enterprises, which means that other elements are used in a similar way.

By verifying individual results of research and hypotheses, the conclusions can be drawn (numerical analysis can be found in **Table 6**) that at the level of significance 0.05, significant differences in the assessment of usefulness of individual management tools included in the group of process tools useful for assessing the functioning of the green supply chain (value p less than 0.05, and the largest difference between F calculated by ANOVA and the theoretical value F from Snedecor's distribution - grey cells in the **Table 6**) occur: among producers of organic food products, including the use of KPI, environmental packaging assessment tools, control of emissions of pollutants occurring in logistics processes, environmental quality house and Environmental Product and Packaging Assessment from the point of view of environmental responsibility. Differences occur only for medium sized organizations, with one exception referring to green taxes. The differences between large companies are significant.

Table 6 Results of studies on differences in the use of management tools and instruments among enterprises producing organic goods

organic products manufacturing				
tool/technique/elements	green supply chain			
	middle		large	
	p -Value	F	p- Value	F
Supply Chain and Value System Model of M.E. Porter	0.6426	3.8843	0.2129	3.9778
SCOR model	0.3223	3.8859	0.1392	3.9778
Balanced scorecard	0.2027	3.8736	0.0703	3.9778
KPIs (Key Performance Indicators)	0.0017	3.8843	0.4597	3.9778
Packaging (environmental) assessment tools	0.0008	3.8843	0.6435	3.9778
Product and packaging assessment from the point of view of environmental responsibility	0.0234	3.8999	0.4131	3.9778
Environmental Quality House (EQFD)	0.0004	3.8843	0.1836	3.9778
Social Life Cycle Assessment (SLCA)	0.0045	3.8843	0.9953	3.9778
Environmental assessment of the technological process	0.1403	3.9002	0.7015	3.9778
Control of emissions of pollutants occurring in production processes	0.0679	3.9001	0.1229	3.9778
Control of emissions of pollutants occurring in logistic processes	0.0212	3.8999	0.2092	3.9798
Selection of suppliers with environmental certificates	0.1365	3.8999	0.1471	3.9798
EU environmental directives and regulations	0.0034	3.8999	0.7665	3.9798
ISO certification (min. ISO1400x)	0.3241	3.9087	0.3184	4.0471
Certification of suppliers	0.137	3.8999	0.5371	3.9798
Eco-efficiency measures and indicators	0.0047	3.8999	0.7194	3.9798
Environmental management system	0.1116	3.8999	0.7385	3.9798
good practices	0.6517	3.8999	0.91	3.9798
Eco-audit	0.0019	3.8999	0.0187	3.9798
Environmental methods of selecting business partners	0.0445	3.8999	0.8677	3.9798
Sharing information	0.5326	3.8999	0.8804	3.9798
Green purchases (supplies)	0.1472	3.9087	0.8383	5.3177
working with suppliers for sustainable development	0.114	3.8999	0.2994	3.9798
Joint Programming with partners	0.3614	3.8999	0.6406	3.9798
Inventory of sources of environmental pollution	0.2	3.8999	0.4317	3.9798
Implementing eco-innovation	0.1228	3.8999	0.2886	3.9798
innovation diffusion models	0.0229	3.8999	0.4343	3.9798
Green taxes	0.0893	3.8999	0.0417	3.9819
Demand for organic products	0.0015	3.8999	0.6202	3.9798

Summarizing the results of the research and theoretical aspects, it should be pointed out that the representatives of organizations that deal with the production of organic food are certainly aware of the existence of a green supply chain strategy and mostly implement its principles. Both methods and tools are not fully used at the level of the whole chain, but for example, a high awareness of the need to have quality certificates or environmental management system in organizations occurs. Significant differences in the use of dedicated tools and concepts can be seen among medium-sized enterprises. This may be related to greater ease of implementation of individual tools, smaller barriers and greater and faster effectiveness of actions taken. The results of the tests clearly indicate that significant differences are present in the range: KPIs (Key Performance Indicators), packaging (environmental) assessment tools, product and packaging assessment from the point of view of environmental responsibility, environmental Quality House (EQFD), social Life Cycle Assessment (SLCA), control of emissions of pollutants occurring in logistic processes, EU environmental directives and regulations, eco-efficiency measures and indicators, eco-audit, environmental methods of selecting business partners, innovation diffusion models and demand for organic products. These differences occur in the medium size enterprises. In the surveys of large companies, significant differences exist only in one area: green taxes.

5. LIMITATION AND DISCUSSION

The presented considerations have limitations, but they contribute to the scientific discussion on the issues taken up.

The first limitation is the territorial range. The research was conducted in Poland and the results are only a part of the studies on green supply chain issues and methods of its evaluation. The research sample amounted to 112 organizations only, however, it should be taken into account that the market of organic products in Poland is in the phase of dynamic development (Hermaniuk, 2016) and the trends known from other, wealthy economies are only just beginning to be implemented in the territory of Poland. On the one hand, it is a limitation, and on the other hand it is a hint for business practitioners who have only recently implemented a new business strategy. The tools, methods and research results indicated may be an indicator and a guideline of what should be used to assess the green supply chain, what may be its components and what factors should be taken into account. It may also indicate how to build a green chain and how to cooperate with other units in the chain. The presented elements are a novelty and the conceptual base presented may serve as a starting point for further development (including dedicated assessment tools and methods) and a better understanding of the nature of the green supply chain. Another limitation is related to the size of the organization. There have been no studies of small enterprises, which may have a completely different approach to individual elements, including the implementation of certain tools. Some of them are unnecessary, and would be ineffective for small organisations, but in the next stages of the research, perhaps such organisations should be surveyed, inter alia, due to the differences between the approach to the green supply chain. It is also worth developing concepts in the context of short food supply chains with a particular focus on organic products (Tundys and Wiśniewski, 2020). Certainly, one of the most important limitations of the surveyed and presented results is to refer to only one sector, to conduct the survey only in Poland, and not to take into account small enterprises. Especially the latter element may influence the occurrence of significant differences in the use of various proposed management tools.

The value of the presented considerations refers to the presentation of the conceptual framework for the green supply chain of organic food products and the identification, on the basis of empirical studies, of differences in the implementation of tools and management concepts into the supply chain that occur between the producers of organic products. The studies indicate a broad context related to the subject matter, particularly important when considering organic products. It is important that chains are green for such products and that all participants are aware of environmental protection. Environmental protection is becoming one of the most important factors deciding about competitiveness. It is connected with, among others, legal and organisational conditions, but also with increasingly changing consumer preferences and increasing demand for ecological products.

6. CONCLUSION

The Green Supply Chain deliberations undertaken are extremely interesting, both from a practical and theoretical point of view. They are a new element of the management strategy, using already known tools and instruments, in some cases redefining them and adapting to new conditions. Aspects of the environment and the need to protect it require new measures within supply chains. This includes, for example, the need to pay more attention to logistics processes to reducing negative impacts on the environment and adding cost, quality, and time to the aspects of environmental protection as priorities. Such an approach requires redefining the chain and implementing new, more ecological solutions or instruments of evaluation of the undertaken activity into its structure.

As a matter of principle, ecological products should be accompanied by a green supply chain. Unfortunately, as research and literature show, this is not always the case. Success in this area can be achieved thanks to the fact that the production of ecological goods, despite constant growth, is not yet a mass production. Compared to conventional agricultural production, it accounts for a small percentage, which should make it easier to implement the green chain strategy and its management.

An important conclusion is that knowledge of sustainable supply chains, especially in the field of organic products, needs to be improved. So that the two elements form a single entity and complement each other. At the same time, appropriate management tools should be promoted to support the implementation of the SSCM and GSCM concepts, so that both concepts are not just about costs but above all about benefits for all stakeholders.

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