

# The impact of quality certificates on sustainable food production: An analysis of selected systems in Poland

Katarzyna Brukało\*, Anna Dolipska, Piotr Romaniuk

Department of Health Policy, Faculty of Public Health in Bytom, Medical University of Silesia, 41-902 Bytom, Poland

\* **Corresponding author:** Katarzyna Brukało, [kbrukalo@sum.du.pl](mailto:kbrukalo@sum.du.pl)

## CITATION

Brukało K, Dolipska A, Romaniuk P. (2024). The impact of quality certificates on sustainable food production: An analysis of selected systems in Poland. *Journal of Infrastructure, Policy and Development*. 8(13): 7892. <https://doi.org/10.24294/jipd.v8i13.7892>

## ARTICLE INFO

Received: 8 July 2024

Accepted: 20 August 2024

Available online: 6 November 2024

## COPYRIGHT



Copyright © 2024 by author(s).

*Journal of Infrastructure, Policy and Development* is published by EnPress Publisher, LLC. This work is licensed under the Creative Commons Attribution (CC BY) license. <https://creativecommons.org/licenses/by/4.0/>

**Abstract:** This study evaluates the influence of quality certificates on sustainable food production in Poland, considering economic, social, and environmental dimensions. Analyzing 25 different certificates, the research explores their criteria, procedures, and costs across various food product categories, including meat, fish, and plant-based products. The study provides a detailed review of certification processes, from initiation to audits and inspections. It identifies both commonalities and differences among certificates, each addressing unique aspects such as environmental impact, worker rights, and product origins. Despite the diversity in standards and procedures, the study underscores the need for standardized international criteria to improve transparency and meet consumer expectations, highlighting the significant role of quality certificates in advancing sustainable food production.

**Keywords:** food industry; quality certificates; sustainable food production; food policy; nutrition policy

## 1. Introduction

Food quality certificates in the European Union (EU) play a vital role in ensuring high standards in the food sector, encompassing aspects such as quality, safety, and sustainability. Food certifications are essential tools for fostering consumer trust, supporting producers, and promoting sustainable practices. They function as a bridge between various interests and objectives, enhancing the overall functionality and transparency of the food sector.

This research evaluates the criteria applied in quality certification systems within the Polish market, with a focus on sustainable development across economic, social, and environmental dimensions. The primary goal is to compare these criteria to identify the key factors emphasized in each system and to assess the diversity and accessibility of food certifications in Poland, predicting their potential impact on promoting sustainable development.

### 1.1. The role of food certificates in the European Union

In the European Union, food certifications play a crucial role in ensuring the quality, safety, and sustainable development of the food sector. They fulfill this role by offering a wide range of benefits and impacts for producers, consumers, and the food system as a whole (Cheftel, 2005).

First and foremost, food certifications provide consumers with confidence in the quality and origin of food products. Since evaluating the quality and safety of food products may be challenging for consumers to be done by themselves, the

certifications serve as a guarantee that a particular product meets specific hygiene, quality, and environmental standards. They empower consumers to make well-informed choices while making purchases and enable them to avoid products of low-quality (Gawron and Theuvsen, 2009).

Secondly, certifications support producers by promoting culinary traditions, regional heritage, and environmentally friendly production practices. Especially small and local producers may benefit from certifications, as they can compete with large corporations, preserving product diversity and safeguarding culinary traditions (Albuquerque et al., 2017).

Thirdly, food certifications align with the concept of sustainable development. They advocate for production practices that minimize environmental impact, preserve biodiversity, and ensure animal welfare. By promoting ecologically and ethically sound production aspects, certifications contribute to sustainable agriculture and a food supply chain (Becker, 2009).

However, while these benefits are significant, the implementation of food certifications is not without its challenges. The costs associated with obtaining and maintaining certifications can be high, especially for small producers who may struggle with the financial and bureaucratic demands. Furthermore, there is a considerable variability in certification standards and their enforcement across different regions and markets. Some certifications may focus narrowly on specific aspects, such as the absence of genetically modified organisms, without addressing broader sustainability or ethical concerns.

This can result in inconsistencies in product quality and effectiveness in promoting comprehensive sustainability (Hajdukiewicz, 2014). For instance, certifications might not adequately address issues like pesticide use or labor practices, which are crucial for a holistic approach to sustainability.

These complexities highlight the need for a balanced approach that acknowledges both the advantages and limitations of food certifications. A critical examination of these challenges can lead to more effective and inclusive certification practices that truly enhance the quality, safety, and sustainability of the food system.

## **1.2. Food certificates in the context of sustainable development**

Food certificates play a crucial role in the context of sustainable development by introducing numerous practices and principles that promote environmental protection, social engagement, and long-term sustainability in the food sector (Kabaja, 2022).

Firstly, organic certifications are a significant component of sustainable development. Products labeled as organic must be grown or produced with minimal impact on the natural environment, including the reduction of use of pesticide and chemical fertilizer, the promotion of renewable energy sources, and waste minimization (Becker, 2009). These practices align with Several Sustainable Development Goals (SDGs), such as Goal 12 (Responsible Consumption and Production) and Goal 15 (Life on Land).

Secondly, certifications often require adherence to fair trade principles, which translates into improved working conditions and incomes for producers in

developing countries. This supports sustainable development goals by addressing global poverty and inequalities. This supports SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities) by addressing global poverty and inequalities. Fair trade certifications also contribute to Goal 8 (Decent Work and Economic Growth) by promoting fair labor practices.

Thirdly, certifications promote the preservation of biodiversity and animal welfare. In agricultural production and animal husbandry, they incorporate ecological and ethical aspects that contribute to long-term sustainable development. This aligns with Goal 14 (Life Below Water) and Goal 15 (Life on Land) by supporting biodiversity conservation and responsible land use.

However, a more critical examination of these certifications is necessary to understand their effectiveness in achieving SDGs. For example, while organic and fair trade certifications address specific aspects of sustainability, they may not comprehensively cover all dimensions of sustainable development. Certifications like GMO-Free focus solely on the absence of genetically modified organisms but may not account for other sustainability factors such as pesticide use or labor practices. Furthermore, challenges in reporting and transparency, as identified in recent studies, highlight gaps in the implementation and assessment of these certifications (e.g., the need for better disclosure of greenhouse gas emissions and other environmental impacts) (Kabaja, 2022).

The effectiveness of certifications in meeting SDGs depends on several factors, including the type and scope of certification, the size and resources of the certifying organization, and the ability to address specific environmental and social issues. Companies need to adopt proactive environmental strategies that include specific performance indicators and objectives to align with SDGs. These strategies should be informed by comprehensive environmental data and transparent reporting to ensure that certifications contribute effectively to sustainable development goals (Rajic, 2021).

Certifications therefore contribute to promoting the sustainable development in the food sector by introducing environment-friendly production practices, fair treatment of producers, and the preservation of ecological balance (Schleifer, 2020). They encourage more conscious and responsible choices from both producers and consumers, which is a key element in achieving sustainable development goals on a global scale.

### **1.3. Popularity of food certificates in the European Union and the most commonly certified food products**

Food certifications in the European Union are gaining increasing popularity among both producers and consumers, driven by growing interest in quality, safety, and sustainable development, as well as the rise of informed consumers. The global food certification market, valued at USD 10.12 billion in 2023, is projected to grow to approximately USD 27.34 billion by 2033, with a compound annual growth rate (CAGR) of 10.45% from 2024 to 2033 (Precedence Research, 2024). Certifications enable consumers to make more informed food purchases, while allowing producers to demonstrate their commitment to high standards (Albuquerque et al., 2017).

In the EU, commonly certified products include:

**Regional and traditional products:** Items from specific regions known for their exceptional taste and quality, such as Parmigiano-Reggiano cheese or Prosciutto di Parma ham from Italy.

**Organic products:** Certified organic products are produced with respect for the environment, typically without artificial pesticides, chemical fertilizers, or genetically modified organisms.

**Fair trade:** Products bearing the Fair Trade logo ensure fair trade practices and decent working conditions for producers, particularly in developing countries.

**Fruits and vegetables:** Certified fruits and vegetables meet stringent production standards, including the minimization of pesticide use.

**Honey:** Certified honey is produced by bees raised according to ecological and animal welfare principles.

**Fishery products:** These certifications ensure sustainable fishing practices and the protection of fish populations.

**Alcoholic beverages:** Certifications for wines, whiskies, and beers confirm their quality and origin.

As sustainable development and environmental protection gain importance, certifications—particularly organic ones—are becoming increasingly significant. This trend supports the promotion of quality and sustainability in the food sector (Becker, 2009).

#### **1.4. The impact of food certificates on the producers' profits**

Having a food certificate has the potential to positively impact the food producers' profits, and at the same time, it plays a crucial role in consumer purchasing decisions (Murphy, 2022).

For producers, having a certificate can contribute to profit growth in several ways. Firstly, certifications serve as a mark of quality and authenticity, which can attract customers willing to pay a higher price for products with documented quality and origin. This, in turn, allows producers to set higher prices and increase profit margins. For example, studies on fair trade certification have shown mixed results. While some studies suggest that Fair Trade-certified farmers may earn higher incomes compared to their non-certified counterparts, others reveal only partial or negligible impacts. Various explanations are offered for these limited effects (Darko et al., 2017). Secondly, certifications grant producers access to specific markets or market segments that may be more profitable (Hajdukiewicz, 2014).

For consumers, food certificates are essential because they provide assurance regarding the quality, origin, and sustainability of food products (Murphy, 2022). Moreover, the global sales of organic food have seen significant growth. From nearly \$18 billion in 2000, sales surged to approximately \$134.76 billion by 2022, reflecting a steady increase in consumer demand for organic products. This growth underscores the broader trend towards sustainable and certified food products (Shahbandeh, 2024). Consumers are increasingly seeking products with high standards, meaning they are willing to pay more for certified products. This means that certificates influence the growth of consumer awareness and shape their

preferences (Sampalean, 2021). For many consumers, a certificate guaranteeing that a product is safe, environmentally friendly, and ethically produced constitutes an added value to the nutritional or sensory quality of the food product (Kaczorowska et al., 2018).

In summary, food certificates have the potential to influence the increase in food producers' profits by enhancing product attractiveness and the ability to set higher prices. At the same time, they are essential for consumers, providing them with confidence in the quality and origin of products and influencing their purchasing decisions (Glogovetan et al., 2022). This is a win-win situation that promotes quality and sustainable development in the food sector.

### **1.5. Aim**

The aim of the study was to review the criteria applied in quality certification systems in agriculture and the food industry present in the Polish market, with a particular focus on the criterion of sustainable development in the context of economic, social, and environmental aspects.

Specific objectives included:

- Evaluate the efficiency of certification procedures;
- Evaluate sustainability criteria in Certification;
- Advocate for continuous improvement and ongoing monitoring to enhance the overall reliability of certification systems.

## **2. Materials and methods**

The methodology employed in the conducted study was based on a desk research approach to collecting, analyzing, and synthesizing information regarding certificates and labels for food products available in the Polish food market. The research process can be characterized through the following stages:

We initiated the study with a literature review (step 1), examining existing publications, academic papers, industry reports, and other documents related to food certificates and labels in Poland. The criteria for selecting publications included relevance to food certifications, credibility of the source, publication date (with preference given to recent studies), and the peer-reviewed status of the documents. We accessed these publications through reputable academic databases such as Scopus, Web of Science, and Google Scholar, ensuring that the sources were authoritative and relevant to the research objectives. Additionally, industry reports, government publications, and reports from recognized certification bodies were included to provide practical and up-to-date insights.

Subsequently, we identified and gathered information on certificates and labels associated with food products available in the Polish market, utilizing sources available in the virtual space (step 2). To ensure a reliable approach and access to the most current data, we relied primarily on information provided on the official websites of certification bodies. These sources are authoritative and offer the latest updates regarding certification processes, criteria, and the number of certified products and producers.

The process involved first collecting data on the identified certificates (step 3),

focusing on key aspects such as certification procedures, the number of certified products and producers, the cost of obtaining the certificate, and detailed criteria, with particular attention to sustainable development criteria. Next, we categorized this information by grouping the certificates based on key features (step 4) such as certification procedures, number of certified products and producers, costs, food product categories, and applied criteria, including social, economic, and environmental aspects of sustainability. Finally, we synthesized the information by summarizing the main characteristics of each category and conducting a comparative analysis of the criteria and quality standards required for each certificate (step 5). This approach provided a comprehensive overview of the diverse aspects associated with food certificates in the Polish market, highlighting their prevalence, alignment with sustainability objectives, and emerging trends. We conducted a review of certificates and labels for food products available on the Polish food market.

Then we synthesized the main characteristics of the identified certificates, grouped in the following categories:

- Certification procedure;
- Number of certified products/number of producers;
- Cost of obtaining the certificate;
- Food product category and applied criteria (with a particular focus on sustainable development criteria).

In the following step, a comparative analysis of the criteria and/or quality standards that products must meet to obtain a specific certificate was conducted.

Acknowledging limitations:

**Scope and depth:** The study's focus on available literature and official sources may not encompass all certification systems or capture the full scope of their practical implications. For example, emerging certifications or recent changes in standards might not be fully represented.

**Data availability:** The reliance on online information from certification bodies, while authoritative, might not reflect issues related to compliance, enforcement, or the lived experiences of producers. Data on certification failures or inconsistencies was not extensively covered.

### **3. Results and discussion**

Based on a review of the literature and other source documents, and databases related to food product certifications, 25 certificates that are most commonly used to label food products in Poland were identified. In this number, 11 are dedicated to various groups of food products, while the remaining ones cover specific food product categories: meat (3 certificates), fish/seafood/algae (2 certificates), plant-based products (7 certificates), and others (2 “recommended” labels)—**Table 1**.

**Table 1.** Certificates for labeling food products, most commonly used in Poland.

Food group	Certificate	Scope	Number of Products/Number of Producers (Polish Food Market)		
Various Groups	<i>Poznaj dobrą żywność</i> —Get to Know Good Food	national	338 products, 78 producers		
	<i>Produkt Polski</i> —Polish Product	national	No data		
	Wolne od GMO—GMO-Free	European	No data		
	<i>Znak Jakość Tradycja</i> —Quality Tradition Mark	National Food Quality System	311 products, 129 producers		
	Fair Trade—Fair Trade	global	No data		
	Ekoland—Ecological Land	national	No data		
	<i>Znak Jakości Q</i> —Quality Mark Q	national	No data		
	<i>Chroniona Nazwa Pochodzenia (ChNP)</i> —Protected Designation of Origin (PDO)	European	516 products, 46 producers		
	<i>Chronione Oznaczenie Geograficzne (ChOG)</i> —Protected Geographical Indication (PGI)	European	24 products		
<i>Gwarantowana Tradycyjna Specjalność (GTS)</i> —Traditional Guaranteed Specialty	European	10 products			
<i>Żywność ekologiczna</i> —Organic Food	European	No data			
Meat	Beef	Quality Meat Program (QMP)	National Food Quality System	No data	
	General	Quality Assurance for Food Products (QAFP)	National Food Quality System	22 producers	
	Pork	Pork Quality system (PQS)	National Food Quality System	10 producers	
Fish/Seafood/Algae		Marine Stewardship Council (MSC/ <i>Naturalnie Bałtyckie</i> )	global	1000 products, 22 producers	
		Aquaculture Stewardship Council (ASC)	global	565 products	
Plants	General	<i>Integrowana Produkcja</i> —Integrated Production	European	2436 products	
	Vegetable and fruit products	<i>Certyfikowany Produkt</i> —Certified Product	National Food Quality System	31 products, 3 producers	
	Soy	Proterra		European	No data
		Round Table on Responsible Soy (RTRS)		European	No data
		The Dunau Soya		European	No data
	Palm oil	The Europe Soya		European	No data
		Roundtable on Sustainable Palm Oil (RSPO)		global	No data
Oilseeds	International Sustainability & Carbon Certification (ISCC)		global	No data	
Others	Drinking water, children's products	<i>Rekomendacja Instytutu Matki i Dziecka</i> —Institute of Mother and Child's Recommendation	national	No data	

In each case, the procedure for obtaining a certificate is quite similar. Since obtaining a certificate is voluntary, the request for obtaining it must come from the food producer (from any stage of production, e.g., farmer, slaughterhouse, processing). Subsequently, there is an audit of documents and a possible visit to the production facility. Each of the certificates is also associated with a fee to be paid,

but none of the analyzed certification systems has established, a single universally accessible pricing scheme. This pricing depends on factors such as the size of the producer, the extent of the audit, or the number of products covered by certification. Furthermore, certifying bodies establish their separate price lists that differ from one another.

### **3.1. Meat**

Certificates for meat products and their derivatives apply to various types of meat. The QMP mark is dedicated to beef, the PQS mark to pork, and the QAFP mark is generally for meat and its derivatives. All of these food quality systems take into account the entire production process, from livestock production through feed producers, transportation, to processing. Through the certification process, all participants can expect production to be carried out in accordance with the adopted system standards in a given area. The product is expected to be of high quality at every stage, and the system of connections is robust and resistant to undesirable situations in the meat production sector. The QMP quality system is noteworthy, as it has the most recently developed standards (in effect since February 1, 2023), clearly adapted to increasing formal requirements and consumer expectations. In this food quality system solely, except of the abovementioned criteria, four additional are also considered: farm and environment (e.g., waste management, recycling, and solid biological waste—manure and slurry), personnel safety and social conditions (accident prevention), economic stability (financial stability), environment, and climate change (control and reduction of greenhouse gas emissions, farm efficiency indicators).

### **3.2. Fish/seafood/algae**

In this area, two certificates have been identified: the Aquaculture Stewardship Council (ASC) and the Marine Stewardship Council (MSC/Naturally Baltic). The main difference between them is that the MSC mark is only found on wild-caught fish and seafood (from wild catches), while the ASC certificate is dedicated to farmed fish and seafood. The specificity of these certificates is that they are mutually compatible. Both consider sustainable fisheries, including areas related to fish farming and the sale of its production. Another common point is the standard for the processing and trade of aquatic organisms for entities involved in the processing, storage, trade, and distribution of fishery products (Chain of Custody—CoC). The ASC CoC standards (certification of the supply chain, i.e., processing and trade of aquatic organisms) help companies and organizations to promote and identify seafood and farmed fish as responsibly and ecologically produced. Certification is possible under the MSC CoC standard, where aquaculture products are treated as an additional scope of certification. The certification process covers fish “from farm to plate”, providing traceability throughout the entire supply chain.

ASC and MSC have published a joint standard for environmentally and socially responsible seaweed production. Seaweed activity has several environmental consequences, such as the impact on water movement and the physical structure of terrestrial and aquatic habitats, as well as changes in water quality, primary and



secondary productivity, and native fisheries (FAO, 2022). Faced with the growing global production of seaweed and the demand for certification, MSC and ASC have developed a joint standard that rewards sustainable seaweed production (both cultivated and wild-growing) and provides a reference point for improvement.

### **3.3. Plant products**

In relation to plant products, seven certificates have been identified. The Integrated Production Certificate is an agricultural certificate promoting a sustainable approach to agricultural production that considers environmental protection. In each European Union Member State, the principles of integrated production are consistent, but the criteria may vary. In Poland, the integrated production methods are dedicated to 42 specific plant species and include criteria such as planning and planting crops with variety selection, and soil fertilization and irrigation. The integrated production certificate aims to combine the best practices from organic and conventional agriculture, which can help reduce the negative impact of agricultural production on the environment. In some countries, economic efficiency is also considered, as an attempt to find a balance between sustainable food production and the needs of farmers and consumers.

The largest number of certificates pertains to soy. Certificates such as Proterra, RTRS, The Danube Soya, and Europe Soya are related to the production of soy and other protein plants and are supposed to promote sustainable practices in the agricultural sector. All of these certificates aim to promote sustainable practices in soy and other protein plant production but differ in terms of geographic scope, specialization, and specific certification criteria and standards. Social issues (workers' rights and the rights of local communities) are considered in the RTRS and Proterra certificates. Danube Soya primarily focuses on crop purity (without pesticides and GMOs), and Europe Soya emphasizes the usefulness of soy in the food industry (by providing high-quality soybean raw materials). In the case of oilseeds, two certificates have been identified: RSPO and ISCC. These are different certificates that differ in scope, specialization, and specific certification criteria. RSPO focuses on palm oil and has detailed criteria related to rainforest protection and workers' rights, while ISCC has a broader scope and considers climate and energy-related issues. The choice of certificate depends on the type of raw material and product, as well as the needs and goals of organizations.

The Certified Product Quality (CP) system is an innovative solution introduced by the National Union of Juice Producers (KUPS) in cooperation with experts from the fruit and vegetable industry and national scientific institutions. The certificate is awarded to fruit and vegetable products that meet strictly defined requirements and have undergone a control procedure. The criteria for this certificate mainly apply to the composition of the product (without added sugar, artificial colorings, and artificial flavors).

In the category of other systems, we identified "recommended" labels provided at the national level by the Mother and Child Institute for food products for children and drinking water. These guidelines include only quality requirements (related to

food composition and safety). Social, sustainable development, or economic criteria are not included in these guidelines.

### **3.4. Food quality systems dedicated to various groups of food products**

Among food quality systems covering various groups of food products can be distinguished:

- National quality systems promoting Polish products;
- European quality systems promoting products from the European Union;
- Quality systems promoting organic products;
- Quality systems promoting high quality and production.

Polish national quality systems: “Quality Tradition Mark”, “Polish Product”, and “Discover Good Food” share a common goal of promoting quality, tradition, and products originating from Poland but differ in their scope and approach. “Quality Tradition Mark” focuses on quality and traditional production methods, “Polish Product” emphasizes the origin of products, and “Discover Good Food” promotes local and traditional products with high quality standards.

“Protected Designation of Origin (PDO) Certificate”, “Protected Geographical Indication (PGI) Certificate”, and “Guaranteed Traditional Specialty Certificate (GTS)” are three different types of labels used in the European Union (EU) to identify and protect unique food products. They aim to identify and protect food products of exceptional quality, tradition, and geographical origin. PDO focuses on protecting the product name and its origin, PGI concentrates on the unique characteristics resulting from geographical origin, and GTS focuses on traditional production methods and preserving the authentic character of the product.

Quality systems promoting organic products include the “Ekoland” certificate, the “Organic Food” certificate, and the “GMO-Free” label. The “Ekoland” certificate is a national certification with ties to Poland. The certificate is awarded based on standards and criteria defined by the “Ekoland” association. On the other hand, the “Organic Food” certificate has an international scope and is based on comprehensive international standards for organic food production, which are more detailed and extensive than the “Ekoland” certificate. Both certifications include the criterion of the absence of GMOs. In contrast, the “GMO-Free” label focuses solely on the absence of genetically modified organisms in the product.

The “Fair Trade” certification and the “Quality Q Mark” are two different types of designations and certifications that relate to the quality and ethics in food and other product manufacturing, although they focus on different aspects of product quality and ethics. Fair Trade focuses on fair working conditions and wages for producers and workers worldwide, as well as supporting community development and eco-friendly practices. The Q Mark is more related to the quality of food and other products in Poland, taking into account quality standards and quality control.

### **3.5. The criterion of sustainable development in food quality systems**

Sustainable development in the context of food certifications pertains to the efforts to produce, process, and distribute food in a manner that simultaneously takes into account three main areas: economic, social, and environmental.

Within sustainable development aspect, food certifications often include economic criteria. This means that producers, suppliers, and workers involved in food production receive fair compensation, and the production process is financially viable. Some certifications, such as Fair Trade, focus specifically on ensuring fair trade conditions and compensation for producers and workers.

Social issues addressed in food certifications include workers’ rights, workplace safety, access to education and healthcare, and support for local communities. Certifications such as Fair Trade, MSC, and QMP include detailed criteria aimed at improving the living conditions of producers and workers in the food industry.

Preserving the natural environment is a crucial element of sustainable development. Food certifications often impose restrictions on the use of pesticides, chemicals, or practices that could harm the environment. Organic food certifications, such as organic food certification, adhere to strict standards for organic production and minimizing the negative impact on the environment.

Certifications such as “Quality Tradition Mark” or “Protected Designation of Origin (PDO)” promote local food products and traditional production methods. This helps preserve the culture and heritage of local communities.

Food certifications consider various components of sustainable development to promote the production and consumption of food that is economically viable, socially just, and environmentally sustainable.

As a result of the analysis of certifications associated with food products in the Polish market, a comprehensive summary of sustainable development criteria was prepared (**Table 2**). Within this summary, key elements pertaining to economic, social, and environmental aspects of the certification process were identified. Common elements include fair labor practices, support for local communities, environmental protection, and promotion of sustainable production methods. Insights derived from this collective summary can serve as a valuable guide for producers, consumers, and industry decision-makers in promoting and selecting certified products with sustainability in mind.

**Table 2.** Comprehensive summary of sustainable development criteria.

Food group	Certificate	Aspects of sustainable development		
		Economic	Social	Environmental
Meat Products and Derivatives	QMP (Quality Meat Program)	Focuses on financial stability in the meat production sector	Includes personnel safety and social conditions	Considers aspects related to waste management and greenhouse gas emissions
	PQS (Pork Quality System)	Covers the entire production process	Encompasses the entire production process	Not directly addressed
	QAFP (Quality Assurance for Food Products)	Takes into account the entire production process	Considers social conditions	Considers the entire production process
Fish/Seafood/Algae	ASC (Aquaculture Stewardship Council)	Encompasses the entire production and trade process	Considers working conditions in the fisheries industry	Emphasizes sustainable fishing and aquaculture practices
	MSC (Marine Stewardship Council)	Encompasses the entire production and trade process	Considers working conditions in the fisheries industry	Emphasizes sustainable fishing practices

**Table 2. (Continued).**

Food group	Certificate	Aspects of sustainable development		
		Economic	Social	Environmental
Plant Products	Integrated Production Certificate	Considers economic efficiency in food production	May address social issues depending on the country	Promotes sustainable agricultural practices
	Proterra, RTRS, The Danube Soya, Europe Soya	Promote sustainable practices in soy and protein plant production	RTRS and Proterra consider workers' rights and local communities	Considerations may include eco-friendly practices
	RSPO (Roundtable on Sustainable Palm Oil) and ISCC (International Sustainability & Carbon Certification)	RSPO focuses on palm oil and workers' rights, while ISCC has a broader scope	RSPO concentrates on workers' rights	Both cover aspects related to environmental protection
Other Systems	Certified Product Quality (CP) system	Not included	Not included	Not included
	Institute of Mother and Child's Recommendation	Not included	Not included	Not included
Food Quality Systems for Various Groups	Polish National Quality Systems (Quality Tradition Mark, Polish Product, Get to Know Good Food)	Promote polish products	Not included	Not included
	EU Labels (PDO, PGI, GTS)	Local production may support the regional economy	May contribute to the preservation of traditions and local culture	Not directly addressed, but local production methods may be associated with sustainable agriculture
	Organic Certifications (Ekoland, Organic Food, GMO-Free)	Economic considerations in organic production standards.	Focus on fair labor practices and worker's right	Focus on organic and environmentally friendly practices
	Fair Trade and Quality Q Mark	Fair Trade focuses on fair compensation	Fair Trade emphasizes fair working conditions	Fair Trade promotes eco-friendly practices

#### 4. Discussion

The diversity of quality systems promoting various food products involves complex and varied approaches to sustainability. Different certifications have distinct criteria, with global standards often being more detailed compared to institute recommendations (Anderson et al., 2018; Hsiang, 2018). This diversity can present challenges for both consumers and producers.

For meat certifications like QMP (Quality Meat Program), PQS (Pork Quality System), and QAFP (Quality Assurance for Farmed Poultry), the focus is on ensuring product quality and safety. QMP, for instance, includes criteria for reducing greenhouse gas emissions and enhancing animal welfare, addressing both environmental and ethical concerns (Steinfeld, 2019). PQS and QAFP also emphasize food safety and traceability but have less comprehensive environmental criteria. As sustainability becomes more significant, newer standards like QMP are adapting to incorporate broader environmental and ethical considerations.

In the realm of fisheries and seaweed production, ASC (Aquaculture Stewardship Council) and MSC (Marine Stewardship Council) certifications are crucial for sustainable resource management. ASC standards focus on minimizing environmental impacts, such as habitat destruction and managing feed resources responsibly. MSC certification requires fisheries to maintain healthy fish stocks, minimize bycatch, and manage ecosystem impacts, addressing critical issues in

marine conservation (Halpern, 2008; Sumaila, 2007). Both systems face challenges in monitoring and enforcement, necessitating ongoing improvements to ensure effective resource management (Froese, 2017).

Plant product certifications, including RTRS (Round Table on Responsible Soy) and integrated production certificates, focus on environmental sustainability by addressing practices such as land use, chemical input reduction, and soil health. RTRS certification requires responsible land-use practices that prevent deforestation and promote biodiversity, while integrated production certifications emphasize minimizing chemical use and improving agricultural practices (Brancalion, 2017). For palm oil, RSPO (Roundtable on Sustainable Palm Oil) certification targets deforestation and habitat destruction by enforcing standards for sustainable land use and transparency. However, local implementation challenges affect the effectiveness of these certifications (Lawrence et al., 2018).

Social criteria are increasingly incorporated into food certifications, addressing fair labor practices and safe working conditions. Fair Trade certification ensures fair wages, safe working environments, and community development for producers in developing countries (Smith and Paladino, 2010). Organic certifications also include some social criteria but primarily focus on environmental sustainability. High certification costs and bureaucratic hurdles, especially for small producers, pose significant barriers (Blackmore et al., 2012; FAO, 2020). The variability in certification standards can lead to inconsistencies in product quality and consumer trust (Institute for Agriculture and Trade Policy, 2019). Narrowly focused certifications, like GMO-Free labels, may not address broader sustainability issues, potentially misleading consumers about a product's overall environmental and social impact (Mie et al., 2017).

This study confirms that food certifications enhance consumer trust and align with sustainable development goals. It supports theories on consumer behavior, sustainable development, institutional norms, and market segmentation (Brundtland, 1987; DiMaggio and Powell, 1983; Kotler and Keller, 2016; Smith, 1956). Effective food certifications are crucial for promoting sustainability across economic, social, and environmental dimensions. To improve these systems, there must be ongoing efforts to enhance transparency, consistency, and effectiveness, ensuring they meet the evolving expectations of both consumers and producers.

The effectiveness of food certifications relies on the interplay between consumers, producers, and decision-makers. Consumers drive demand for certified products by prioritizing certifications that align with their values on sustainability and ethics. Their purchasing choices can influence producers to adopt and maintain high standards, enhancing environmental and social practices.

Producers, in turn, need to continuously adapt their practices to meet evolving certification standards. They must balance the costs and benefits of certification while addressing consumer expectations and regulatory requirements. Engaging with certification bodies is crucial for understanding criteria and improving compliance.

Decision-makers play a pivotal role by shaping the regulatory landscape and harmonizing standards across different certifications. By promoting transparency, providing incentives, and enforcing regulations, they can enhance the effectiveness of certification systems and address implementation challenges.

### Recommendations for enhancing food certification systems:

#### For consumers:

Understand certification labels: Educate yourself about what each certification label represents, including the specific criteria for quality, sustainability, and ethical practices. Look for resources or guides that explain the differences between certifications.

Prioritize certified products: Choose products with certifications such as Fair Trade, ASC, MSC, and organic, which are known for their rigorous standards in promoting sustainable and ethical practices.

Support local and traditional products: Opt for locally produced and traditional products that carry certifications like “Quality Tradition Mark” and “PDO”. These certifications often support local economies and preserve cultural heritage.

Evaluate cost vs. value: Consider the cost of certified products in relation to their benefits. While certified products might be more expensive, their higher standards can offer greater environmental and social value. Advocate for transparency by requesting clear information about certification processes and their impact from producers and retailers.

#### For producers:

Pursue continuous improvement: Regularly review and update production practices to align with evolving certification standards. Invest in training and technology that enhance environmental and social performance.

Conduct cost-benefit analyses: Assess the financial impact of obtaining and maintaining certifications. Analyze how certifications can affect market access, consumer preferences, and overall profitability.

Engage with certification bodies: Actively participate in discussions with certification organizations to gain a clear understanding of their criteria and provide feedback for improving the certification process. This engagement can help streamline compliance and enhance the relevance of standards.

#### For decision-makers:

Harmonize certification standards: Work towards developing and implementing standardized criteria across certifications to reduce consumer confusion and ensure consistency. This could involve creating a unified framework that integrates the best practices from existing standards.

Promote awareness and incentives: Launch educational campaigns to increase consumer awareness about the benefits and limitations of various certifications. Provide financial incentives, such as subsidies or tax benefits, to producers who adopt and adhere to recognized sustainable practices.

Enhance regulatory oversight: Strengthen regulatory frameworks to ensure that certification bodies adhere to their stated standards. Implement regular audits and transparency measures to verify compliance and address discrepancies. Support research to address challenges in certification processes and explore ways to improve their effectiveness.

In summary, tackling the challenges of food certifications requires a multifaceted approach. Consumers should educate themselves and make informed choices, producers need to continuously improve and engage with certifying bodies, and decision-makers must work towards harmonizing standards and enhancing

transparency. These actionable steps will contribute to a more effective and sustainable food certification system, meeting the expectations of both consumers and producers. In conclusion, food certifications play a vital role in promoting sustainable development by addressing economic, social, and environmental aspects. Ongoing efforts to enhance transparency, consistency, and effectiveness in certification systems are essential for meeting the expectations of consumers and producers.

Future research should focus on expanding data sources and assessing the impacts of certifications by interviewing producers, certification bodies, and experts to gain deeper insights into the challenges and effectiveness of these systems. Additionally, sector-specific and regional studies should be conducted to explore how certifications impact different food sectors and vary across regions, providing a clearer understanding of their effectiveness and local implications.

## **5. Conclusion**

This study offers a comprehensive examination of food certifications and their role in promoting sustainability within the food industry. The key findings and implications of the research can be summarized as follows:

**Certification procedures:** The process for obtaining food certifications generally involves voluntary participation, document audits, and facility inspections. However, there are significant variations in the specifics of these procedures, such as the frequency and depth of audits, and the complexity of required documentation. These differences can create challenges, especially for small-scale producers who may struggle with the varying requirements across different certification systems.

**Costs of certification:** Certification costs vary widely, influenced by factors such as producer size, audit scope, and product range. The absence of standardized pricing models across certifying bodies can result in financial barriers for smaller producers, potentially limiting their access to certification. The financial burden of certification, combined with the complexity of managing certification-related documentation, poses a significant challenge.

**Certification types and their focus areas:**

**Meat certifications:** Programs like QMP (Quality Meat Program) focus on ensuring high standards in meat production, incorporating detailed criteria that address environmental and economic aspects. This adaptability to changing consumer and regulatory demands is crucial, though it may present compliance challenges.

**Fish/seafood/algae certifications:** ASC (Aquaculture Stewardship Council) and MSC (Marine Stewardship Council) certifications emphasize sustainable practices in fisheries and seaweed production. Despite advancements, there are ongoing challenges in monitoring and enforcing standards across complex global supply chains.

**Plant product certifications:** Certifications for plant products, including integrated production certificates, aim to promote sustainable agricultural practices. These certifications combine aspects of organic and conventional agriculture but can vary in their effectiveness and criteria.

**Quality systems:** The diversity of food quality systems—national, European, organic, and high-quality production—reflects different approaches to promoting sustainability and quality. While this diversity allows for tailored approaches, it also creates complexity and potential confusion among consumers and producers.

**Sustainable development:** Food certifications that integrate economic, social, and environmental aspects contribute to sustainable development by ensuring fair compensation, upholding worker rights, and protecting the environment. However, the effectiveness of these certifications can vary, impacting their overall contribution to sustainable development goals.

**Challenges and recommendations:** The study identifies key challenges related to certification diversity, including issues of transparency, oversight, and effectiveness. To address these challenges, there is a need for:

**Enhanced transparency and oversight:** Improved monitoring and transparency in certification processes are essential for ensuring the integrity and effectiveness of certifications.

**Harmonization of standards:** Efforts towards standardizing certification criteria can reduce confusion and streamline compliance for producers.

**Ongoing improvement:** Continuous evaluation and refinement of certification practices are necessary to better align with sustainability goals and meet the expectations of consumers and producers.

In summary, while food certifications play a critical role in advancing sustainability, addressing the identified challenges and implementing the recommended actions will enhance their effectiveness and support the broader goals of sustainable development.

**Author contributions:** Conceptualization, KB and PR; methodology, KB and PR; validation, KB and AD; formal analysis, KB and AD; investigation, KB and AD; resources, KB and AD; writing—original draft preparation, KB and AD; writing—review and editing, KB and AD; supervision, PR. All authors have read and agreed to the published version of the manuscript.

**Conflict of interest:** The authors declare no conflict of interest.

## References

- Albuquerque, T. G., Beatriz, M., Oliveira, P. P., & Costa, H. S. (2017). 25 years of European Union (EU) quality schemes for agricultural products and foodstuffs across EU Member States. *Journal of the Science of Food and Agriculture*, 98, 2475–2489.
- Anderson, K., Meloni, G., & Swinnen, J. (2018). Global alcohol markets: Evolving consumption patterns, regulations, and industrial organizations. *Annual Review of Resource Economics*, 10, 105–132.
- Bäckstrand, K., & Lövbrand, E. (2015). *Research handbook on climate governance*. Edward Elgar Publishing.
- Becker, T. (2009). European Food Quality Policy: The importance of geographical indications, organic certification and food quality assurance schemes in European countries. *The Estey Centre Journal of International Law and Trade Policy*, 10, 111–130.
- Blackmore, E., Keeley, J., Pyburn, R., et al. (2012). Pro-poor certification: Assessing the benefits of sustainability certification for small-scale farmers in Asia. International Institute for Environment and Development (IIED).
- Brancalion, P. H. S., Lamb, D., Ceccon, E., et al. (2017). Using markets to leverage investment in forest and landscape restoration in the tropics. *Forest Policy and Economics*, 85, 103–113.



- Brundtland, G. H. (1987). *Our common future*. World Commission on Environment and Development (WCED).
- Cheftel, J. C. (2005). Food and nutrition labelling in the European Union. *Food Chemistry*, 93, 531–550.
- Darko, E., Lynch, A., & Smith, W. (2017). *The impact of Fairtrade: A review of research evidence 2009–2015*. Overseas Development Institute.
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147–160.
- FAO. (2020). Terminal evaluation of “Strengthening global capacity to effectively manage areas beyond national jurisdiction”. FAO.
- FAO. (2022). *Thinking about the future of food safety—A foresight report*. FAO.
- Froese, R., Demirel, N., Coro, G., et al. (2017). Estimating fisheries reference points from catch and resilience. *Fish and Fisheries*, 18, 506–526.
- Gawron, J. C., & Theuvsen, L. (2009). Certification schemes in the European agri-food sector: Overview and opportunities for Central and Eastern Europe. *SAGE Journals*, 38, 4–5.
- Glogovetan, A., Dabija, D. C., Fiore, M., & Pocol, C. B. (2022). Consumer perception and understanding of European Union quality schemes: A systematic literature review. *Sustainability*, 14, 61–67.
- Hajdukiewicz, A. (2014). European Union agri-food quality schemes for the protection and promotion of geographical indications and traditional specialties: An economic perspective. *Folia Horticulturae*, 26, 3–17.
- Halpern, B. S., Walbridge, S., Selkoe, K. A., et al. (2008). A global map of human impact on marine ecosystems. *Science*, 319(5865), 948–952.
- Hsiang, S., & Kopp, R. E. (2018). An economist’s guide to climate change science. *Journal of Economic Perspectives*, 32(4), 3–32.
- Institute for Agriculture and Trade Policy. (2019). *Working landscapes certificate information*. Institute for Agriculture and Trade Policy.
- Kabaja, B., & Varese, E. (2022). The popularity of EU ecolabel product certification in Poland. *Scientific Papers of Silesian University of Technology*, 163, 185–198.
- Kaczorowska, J., Rejman, K., & Nosarzewska, J. (2018). Perception of food products marked with certificates fulfilling the idea of sustainable consumption (Polish). *Domestic Trade*, 373, 222–234.
- Kafel, P., & Sikora, T. (2011). Benefits of implementation and certification of management systems in the food industry enterprises. In: *Proceedings of the 5th International Quality Conference*.
- Karlsson-Vinkhuyzen, S., Boelee, E., Cools, J., et al. (2018). Identifying barriers and levers of biodiversity mainstreaming in four cases of transnational governance of land and water. *Environmental Science & Policy*, 85, 132–140.
- Konefal, J., Mascarenhas, M., & Hatanaka, M. (2005). Governance in the global agro-food system: Backlighting the role of transnational supermarket chains. *Agriculture and Human Values*, 22, 291–302.
- Kotler, P., & Keller, K. L. (2016). *Marketing management* (15th ed.). Pearson.
- Lawrence, M. G., Schäfer, S., Muri, H., et al. (2018). Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals. *Nature Communications*, 9.
- Lyu, Y., Shi, P., Han, G., et al. (2020). Desertification control practices in China. *Sustainability*, 12(8), 3258.
- Mie, A., Andersen, H. R., Gunnarsson, S., et al. (2017). Human health implications of organic food and organic agriculture: A comprehensive review. *Food Policy*, 68, 19–31.
- Murphy, B., Martini, M., Fedi, A., et al. (2022). Consumer trust in organic food and organic certifications in four European countries. *Food Control*, 133.
- Precedence Research. (2024). *Food certification market size, share, and trends 2024 to 2033*. Available online: <https://www.precedenceresearch.com/food-certification-market> (accessed on 1 July 2024).
- Rajic, S., Djordjevic, V., Tomasevic, I., & Djekic, I. (2022). The role of food systems in achieving the sustainable development goals: Environmental perspective. *Business Strategy and the Environment*, 31(3), 988–1001. <https://doi.org/10.1002/bse.2930>
- Sampalean, N. I., Rama, D., & Giulio, V. (2021). An investigation into Italian consumers’ awareness, perception, knowledge of European Union quality certifications, and consumption of agri-food products carrying those certifications. *Bio-based and Applied Economics*, 10, 35–49.

- Schleifer, P., & Sun, Y. (2020). Reviewing the impact of sustainability certification on food security in developing countries. *Global Food Security*, 24.
- Shahbandeh, M. (2024). Worldwide sales of organic food from 1999 to 2022. Available online: <https://www.statista.com/statistics/273090/worldwide-sales-of-organic-foods-since-1999/> (accessed on 1 July 2024).
- Smith, S., & Paladino, A. (2010). Eating clean and green? Investigating consumer motivations towards the purchase of organic food. *Australasian Marketing Journal*, 18(2), 93–104.
- Smith, W. R. (1956). Product differentiation and market segmentation as alternative marketing strategies. *Journal of Marketing*, 21(1), 3–8.
- Steinfeld, H. (2019). Livestock and climate change: What are the options? *Landbauforschung-Journal of Sustainable and Organic Agricultural Systems*, 69, 1–4.
- Sumaila, U. R., & Pauly, D. (2007). All fishing nations must unite to cut subsidies. *Nature*, 450, 945.
- Verbeke, W., Van Wezemael, L. de Barcellos, M. D., et al. (2010). European beef consumers' interest in a beef eating-quality guarantee: Insights from a qualitative study in four EU countries. *Appetite*, 54(2), 289–296.