

ENHANCING ENVIRONMENTAL STANDARDS IN TEXTILES: THE ROLE OF OEKO-TEX® STANDARD 100

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Abstract: *As demand for sustainable products rises across industries, eco-labels effectively communicate a product's sustainability credentials to environmentally aware consumers. This paper aims to highlight the significance of these certifications, particularly OEKO-TEX® STANDARD 100, in enhancing company compliance with international standards and appealing to environmentally conscious consumers. A comprehensive analysis was conducted, utilizing various sources, including industry reports, case studies, and online data. The findings emphasize the role of certification in ensuring product safety from harmful substances, promoting transparency in the supply chain, and supporting sustainable practices.*

Key words: *eco-label, textile industry, OEKO-TEX® STANDARD 100, sustainability*

1. Introduction

The textile industry is known to have a considerable impact on the environment, predominantly in the form of water pollution, high energy consumption, and greenhouse gas emissions (Zhang et al., 2018). This has led to a substantial environmental impact, so the industry has adopted sustainable practices. In today's society, consumers are aware of the harmful effects of textile pollution, such as greenhouse emissions, global warming, and an increased carbon footprint. As a result, there is growing demand for sustainable textiles. This highlights the need for greater awareness and emphasis on environmentally sustainable practices in the textile industry (Fiber 2 Fashion, 2014).

The market for sustainable textile materials is expected to grow strongly from 2024 to 2031, propelled by a surge in demand for eco-friendly textiles, technological advancements, and supportive governmental regulations. Overall, the sustainable textile material market presents significant opportunities for growth for both established firms and new entrants, with emerging trends and market dynamics fostering a favourable environment for expansion (Market Research Intellect, 2024).

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In the past few years, several clothing brands have emerged that are committed to promoting sustainability. These companies prioritize the use of ethical and eco-friendly materials and have adopted the 5R philosophy - Reduce, Reuse, Recycle, Redesign, and Reimagine - to guide their operations (Choi and Li, 2015).

As a result, consumers' attitudes towards environmentally friendly textile products have changed positively. Growing consumer awareness and shifting towards sustainable products are also expected to contribute to market growth. Furthermore, customers' focus on health and wellness is likely to drive the expansion of the market as they increasingly prefer products that align with their values and lifestyle choices (Gazzola et al., 2020; Pereira et al., 2021).

Companies often use environmental certificates to influence consumer purchase preferences. These certificates are labels affixed to products, and their main objective is to inform consumers about a product's environmental impact, such as its carbon footprint, water usage, and waste generated. By providing this information, companies hope to encourage consumers to choose more eco-friendly products, thereby reducing the environmental impact of their purchasing decisions (Zver and Vukasović, 2021).

Consumers often face numerous eco-labels that look similar and have unclear meanings. Too many eco-labels are available, and they use different methods and standards, making it hard for consumers to understand and compare them. This results in overwhelming information, causing confusion and uncertainty. Moreover, the assessment methods used for these labels are only sometimes transparent, which adds to the confusion. All these factors significantly impact consumer perceptions of eco-labels, leading to a general sense of uncertainty and mistrust (Ziyeh and Cinelli, 2023).

Consumers are increasingly aware of the environmental and societal impact of their choices. They are curious about the origins and production processes of their garments and actively seek to understand the ecological and ethical implications of their purchases. This growing consumer consciousness underscores the importance of reliable sources of information in the marketplace.

Furthermore, research (Nassivera et al., 2017; Ellis et al., 2012; Nam et al., 2017; Zver and Vukasović, 2021) has revealed a substantial market segment that is willing to pay more for sustainable and eco-friendly products, including textiles certified by reputable standards like OEKO-TEX®. These consumers are cognizant of the environmental consequences of their choices and are prepared to invest in products that align with their values and beliefs. This consumer demand for sustainability has significant economic implications.

By exploring how eco-labels can bridge the gap between consumer demand for sustainable products and the complexity and confusion surrounding these certifications, this article aims to elucidate eco-labels effectiveness in fostering a more sustainable fashion industry.

2. The Essentials of Eco-labels

Environmental labelling has become increasingly significant in the global marketplace as consumers and manufacturers seek ways to address the environmental impacts of

products and services. The eco-label, an established environmental labelling system, plays a crucial role in this movement. Developed in response to heightened global awareness and the demand for sustainable and responsible practices, the eco-label guides consumers and producers in making environmentally conscious choices. By identifying products and services designed to minimize ecological damage and conserve natural resources, the eco-label helps to highlight environmentally preferable options (Ecological Certification Institute).

Eco-labels are marks placed on product packaging or in e-catalogues that help consumers and institutional purchasers quickly and easily identify products that meet specific environmental performance criteria and are deemed "environmentally preferable". Eco-labels can be owned or managed by government agencies, nonprofit environmental advocacy organizations, or private sector entities (United States Environmental Protection Agency, 2023).

According to Eckart (2001), an eco-label is a label protected by law given to a product that meets specific environmental and social standards. This label recognizes the product's compliance with predetermined criteria and acknowledges its environmental leadership.

Eco-labels can be classified in different ways. Although there are two types of eco-labels - voluntary and mandatory - they are crucial in promoting products with less negative environmental impacts throughout their life cycles (Rubik and Frankl, 2017).

Furthermore, Gordy (2002) highlighted that eco-labels serve three primary objectives: to prevent misleading environmental advertising, raise awareness among consumers, encourage them to make environmentally preferable decisions, and offer market-based incentives that promote products and production processes with reduced environmental impacts.

In summary, eco-labels play a pivotal role in the global marketplace by guiding consumers and producers toward environmentally responsible choices.

2.1. Development of eco-labels for sustainable textiles

Many companies are turning to sustainability certifications as the demand for ethical and sustainable products increases. These certifications are crucial for meeting global regulatory standards and help companies build consumer trust and gain a competitive advantage. Prominent sustainability certifications such as OEKO-TEX®, GOTS, and Bluesign have specific criteria that focus on various aspects of sustainability, including chemical use, fair labour practices, and environmental impact.

GOTS (Global Organic Textile Standard) is an organic certification that ensures products are organic at every production stage, with eco-friendly waste treatment, fair labour practices, and toxin-free dyes. It is recognized internationally and sets global textile processing requirements for organic fibres, incorporating ecological and social criteria. GOTS-certified final products may include fibre, yarns, fabrics, clothes, home textiles, mattresses, personal hygiene products, and more (Global Standard).

Bluesign® is a label that identifies fabric and apparel producers who have analysed their manufacturing chain and are investing in research and development to reduce

their ecological footprint. It unites the textile value chain and works with system partners to develop unique solutions for reducing the impact on people and the planet (Bluesign).

OEKO-TEX[®] offers tools for managing and communicating safety and sustainability initiatives. Its modular system facilitates the integration of these services, enhancing traceability, transparency, and cost efficiency throughout the textile and leather supply chains (*OEKO-TEX OUR STANDARD*).

These certifications are crucial in differentiating products in the market, influencing purchasing decisions, and enhancing consumer trust and brand loyalty.

To achieve sustainability certification, companies must ensure that their entire supply chain, from sourcing raw materials to producing finished products, complies with specific environmental and social standards. This push towards greater transparency and accountability drives the trend towards more stringent and comprehensive certifications that cover not only environmental impacts, but also social implications.

2.2. Eco-label criteria for clothing and textile products

The eco-label is a trusted marker for environmentally and socially responsible clothing and textile products. Below is an overview of the main criteria for evaluating products seeking eco-label certification, ensuring they meet high sustainability and ethical conduct standards throughout their lifecycle (Ecological Certification Institute).

- *Textile fibre criteria*

This category covers a range of natural and synthetic fibres, including cotton, flax, and wool, as well as synthetics such as acrylic, elastane, and polyester.

- *Parts and accessories criteria*

This involves fillers, coatings, laminates, membranes, and other components used in textile production.

- *Chemicals and process criteria*

This set of standards, a crucial part of the eco-label criteria, mandates the limited use of harmful substances, promoting safer alternatives in the dyeing, printing, and finishing processes. It also addresses energy efficiency in washing, drying, and curing processes and managing emissions to air and water, thereby significantly reducing the environmental and health risks associated with textile production.

- *Suitability for use criteria*

This comprehensive evaluation includes assessments for dimensional stability, colour fastness (against washing, perspiration, rubbing, and light), resistance to pilling and abrasion, and the overall durability of the textile's functional attributes. These stringent tests ensure that eco-label textiles are environmentally friendly and of superior quality and durability, instilling confidence in the certification process.

- *Corporate Social Responsibility criteria*

These standards emphasize fundamental rights in the workplace and specific operational practices, such as prohibiting denim sandblasting.

These criteria ensure that textiles with the eco-label adhere to rigorous environmental and social standards across their lifecycle.

By obtaining sustainability certification, companies can enhance their brand reputation, ensure international compliance, and appeal to the growing demographic of environmentally conscious consumers. Therefore, sustainability certifications are becoming increasingly essential for companies that want to meet consumer demands for ethical and sustainable products while maintaining a competitive edge in the global marketplace.

3. Methodology

Our research delves into the effectiveness and scope of the OEKO-TEX® STANDARD 100 certification.

The main objective of our research is to detail the numerous advantages that the OEKO-TEX® STANDARD 100 certification offers businesses, especially those facing the complex demands of maintaining ecological and consumer safety standards. This certification is increasingly relevant for companies looking to improve their marketability and compliance with international safety regulations.

To enhance our analysis, we have sourced data from a variety of channels, including publications from certified textile manufacturers and industry analyses that shed light on the adoption and impact of the OEKO-TEX® certification; online research companies and media agencies that provide insights into current trends and the certification's influence on market dynamics and consumer preferences. While the certification is widely recognized and utilized, a gap exists between the perceived and actual benefits.

4. OEKO-TEX® Standard 100

In the late 20th century, the idea of environmental certifications in textiles started gaining popularity as more and more people became aware of environmental issues. Initially, these certifications were basic and focused on removing harmful substances and ensuring safety in textile production processes. However, as environmental awareness grew, the scope of certifications expanded. In the 1990s, major textile producers and brands started to adopt broader sustainability practices, which marked a significant period in the industry.

OEKO-TEX® (the International Association for Research and Testing in the Field of Textile and Leather Ecology) is globally recognized as the most extensive and renowned label for textiles tested for harmful substances. This standard has undergone several revisions and updates and evolved to include more rigorous environmental criteria and social requirements. OEKO-TEX® comprises independent textile and leather testing institutes in Europe and Japan, with a presence in over 70 countries. OEKO-TEX® collaborates to develop test methods and define limit values that form the basis of their trusted standards:

1. The product labels OEKO-TEX® MADE IN GREEN, OEKO-TEX® STANDARD 100, OEKO-TEX® ORGANIC COTTON and OEKO-TEX® LEATHER STANDARD;
2. The production facility certification OEKO-TEX® STeP (Sustainable Textile & Leather Production);

3. Chemicals certification OEKO-TEX® ECO PASSPORT;
4. The OEKO-TEX® RESPONSIBLE BUSINESS certification is designed to manage supply chain due diligence.

The OEKO-TEX® STANDARD 100 was introduced in 1992 to ensure that textile products were free of harmful chemicals.

Today, the OEKO-TEX® STANDARD 100 is recognized as a comprehensive certification system that guarantees the safety of textile products for humans and the environment. It limits the use of harmful substances in textile production, including heavy metals, formaldehyde, and pesticides. With continuous development and improvement, the OEKO-TEX® STANDARD 100 is a worldwide benchmark for sustainable and responsible textile production (OEKO-TEX ORGANISATIONS).

4.1. Benefits of OEKO-TEX® modular system

The OEKO-TEX® STANDARD 100 tests for harmful substances are based on a modular system, meaning certification is available for every step of the textile value creation chain. Certificates from previous stages are recognized at subsequent stages without further testing.

An article will only receive the STANDARD 100 certificate and label if all its components comply with the established criteria. This includes the outer fabric and sewing threads, linings or coatings, prints, and accessories such as buttons or zippers (Hohenstein).



Fig.1. OEKO-TEX® modular system

Source: <https://www.hohenstein.com/en/oeko-tex/output-control/standard-100>

The STANDARD 100 certification considers the intended use of the product. It acknowledges that the greater the skin contact and the more sensitive the skin, the stricter the human-ecological requirements must be. This insight is why STANDARD 100 differentiates among four product classes, ensuring the appropriate level of safety for each:

- Product class I: Items for babies and small children up to 3 years old.
- Product class II: Materials that come into contact with skin.
- Product class III: Materials that do not come into contact with skin.
- Product class IV: Home textiles.

The STANDARD 100 product label provides trustworthy evidence to consumers and buyers that textile products have undergone rigorous global testing to prevent exposure to hazardous substances.

4.2. OEKO-TEX STANDARD 100 advantages

The OEKO-TEX® STANDARD 100 certification offers numerous advantages to consumers and manufacturers, emphasizing its role in promoting environmental and consumer safety. Here are some of the key benefits associated with the OEKO-TEX® STANDARD 100 certification:

- *Consumer safety*

The OEKO-TEX® STANDARD 100 certification guarantees that textiles, from their raw materials to the final products, including all components like buttons and zippers, undergo rigorous testing for harmful substances. This thorough testing ensures consumers that certified products are safe for direct contact with their skin, which is particularly noteworthy for clothing, bed linens, and other home textiles.

- *Product credibility*

The safety and ecological standards of products carrying the OEKO-TEX® label are globally recognized. This label can improve a brand's market reputation and credibility, especially among environmentally and health-conscious consumers. This recognition can help attract a significant number of such consumers.

- *Market access*

Meeting the requirements of OEKO-TEX® STANDARD 100 can help businesses enter international markets that prioritize chemical safety in textile manufacturing. This certification is especially beneficial in regions with strict regulations regarding environmental sustainability and consumer safety.

- *Supply chain transparency*

All aspects of the manufacturing process must meet the required safety and environmental standards for a product to receive OEKO-TEX® certification. This certification promotes transparency throughout the supply chain by motivating manufacturers to continuously assess and enhance their practices and materials.

- *Environmental impact*

OEKO-TEX® STANDARD 100 helps protect the environment by restricting harmful chemicals in textile production. This encourages manufacturers to utilize safer alternatives and adopt more sustainable production methods.

- *Enhanced consumer trust*

Consumers increasingly look for products that do not harm the environment or their health. The OEKO-TEX® label serves as a tool for consumers to identify products that meet their values, enhancing trust and loyalty toward a brand.

- *Competitive advantage*

In a competitive market, an OEKO-TEX® certification can differentiate a brand and its products from competitors who do not meet these high standards. This differentiation can be a critical factor in a consumer's purchase decision.

- *Cost efficiency in compliance*

Navigating the complex regulations about textile chemical use can take time and effort for businesses. OEKO-TEX® STANDARD 100 provides a clear framework for compliance, potentially reducing the need for multiple individual tests and aligning with global standards, thereby saving costs.

In conclusion, the OEKO-TEX® STANDARD 100 provides comprehensive benefits supporting ecological sustainability and business operations. As consumer awareness and environmental and chemical safety regulations grow, certifications like OEKO-TEX® STANDARD 100 will become increasingly crucial in the textile industry. This certification supports environmental and consumer safety and enhances market competitiveness and brand reputation (OEKO-TEX **MK**).

5. Conclusions

Eco-labelling is a specific form of environmental labelling that informs consumers about the environmental quality of materials and substances used in the textile industry. These labels, known as eco-labels, are issued by programs at national or regional levels.

Textile labels are essential for consumers worldwide. The primary considerations when buying clothes and fabrics are the quality of the product and its impact on health. To mitigate the environmental and health effects of textile products, it is important to maintain ongoing global and EU discussions about the environmental impact of textile production.

An increase in certified products signifies an advantage in displaying the eco-label. The widespread use of eco-labels and eco-textiles helps distinguish one eco-textile from another in the competitive market. Therefore, raising awareness about sustainable materials and textile products is essential.

In summary, certifications like OEKO-TEX® STANDARD 100 are increasingly crucial in the modern textile industry, reflecting a broader shift towards sustainability and safety. These certifications ensure products are free from harmful substances and foster eco-friendly manufacturing processes, providing a clear benefit to consumers and the environment. As the industry faces growing pressure to reduce its ecological footprint and improve social responsibility, certifications such as OEKO-TEX® offer a valuable mechanism for companies to demonstrate their commitment to these goals. This aligns with consumer expectations and regulatory demands, positioning businesses that pursue such certifications at the forefront of the industry's transformation.

Ultimately, embracing these standards is essential for driving the sustainability agenda

in the global marketplace, promoting healthier practices, and building consumer trust in textile products.

Future studies should delve deeper into this topic to better understand how consumers perceive eco-labels and their trust level. Specifically, examining the various attributes of eco-labelling methods and how they are presented to consumers could provide valuable insights. By doing so, we can establish more consistent and transparent communication about the sustainability performance of clothing products. This, in turn, will help alleviate the current uncertainty experienced by eco-conscious consumers.

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