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Reuse of Waste Clothes with Eco Print Method

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Abstract

After the production processes of the apparel and fashion industry, which is one of the global industries, and the consumption of customers, a significant amount of waste occurs and causes environmental pollution. Considering the parameters such as rapidly changing fashion, mass production, and water consumption in washing, it is seen that the waste problem in these sectors is quite high. These vital waste problems have led brands, producers and consumers to increase their awareness and to carry out many studies within the framework of the concept of sustainability.

In this study, first of all, evaluations were made on the sustainability studies of the apparel and fashion industry. Within the scope of the principle of reuse, which is one of the basic rules of the sustainability concept, the ecoprint method, which is an environmentally friendly approach, is explained for the reuse of waste clothes after consumer use. With the ecoprint method, completely different, original and unreproducible patterns were applied to the clothes that became waste after consumer use, such as faded or stained clothing. Thus, it has been possible for the apparel and fashion industry to transform and reuse waste clothes into unique and original products with an environmentally friendly approach. It is thought that this study will shed light on future studies within the scope of the concept of sustainability in the apparel and fashion industry, and will especially guide the designers in the field of reuse.

Keywords: fashion, sustainability, ecoprint, consumer waste, reuse.

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Introduction

Sustainability has become a common topic in the fashion industry (Thomas, K., 2020: 724). Especially in the last decade, with the increase in awareness on this issue, many fashion companies have started to include sustainability issues in their products (Puspita, H. and Chae, H., 2021: 133). Events such as global population growth, climate change, land and water scarcity have intensified in recent years, and sustainability pressures on both products and production processes have become more important in this sector (Gazzola, P. et al., 2020: 3). In this context, the concept of sustainable fashion has emerged. Sustainable fashion seek to empower workers throughout the supply chain, utilise upcycling, recycling, and traditional production techniques, and incorporating renewable and organic raw materials (Henninger, C. E., 2016). It includes all aspects of a garment's life cycle, such as fiber, fabric and garment production, distribution, reuse and waste management (Fletcher, 2008: 42).

When considering the life cycle stages of a garments, it is seen that the consumption of energy, chemicals and water high and this causes the environment pollutions (Jung, S. and Jin, B. 2014: 511). Regarding the parameters such as rapidly changing fashion, mass production, and water consumption for washing, it is seen that the waste problem is quite high. These vital waste problems have led brands, producers and consumers to increase their awareness and to carry out many studies within the framework of the concept of sustainability.

It should be designed and constructed a new system and basis for value creation, to help face future challenges in the fashion industry (Niinimäki, K., 2015:2).

Sustainability in Apparel and Fashion Industry

Increasing awareness of producers and consumers about environmental problems has also made them conscious of sustainability. Consumers prefer environmentally friendly clothing and manufacturers are looking for ways to meet these demands. With the increasing consumer interest in the environmental effects of clothing production, many companies such as Coop Switzerland, Levi Strauss & Co, Marks & Spencer, Nike, Noir, Patagonia and Marta have implemented sustainable practices (Parali, A., 2020:123).

The concept of sustainability in the clothing industry came to the fore in the 1960s and 70s with the transition to large volumes of production, decreasing manufacturing costs and increasing consumption amounts. The 1987 report of the United Nations World Commission on Environment and Development and the 3R: Reduce, Reuse, Recycle principle, which developed around the concept of ecological efficiency, constitutes the main idea of sustainable practices in the clothing industry today (Akdoğan Öneme, A. and Bursalgil, 2022:26).

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Increasing awareness of consumers has pushed manufacturers to work in this field, and 3R applications have come to the fore in the effective management of textile waste. The aim of the 3R approach is to extend the life of the products and to provide maximum benefit from these products (Yücel and Tiber, 2018: 375).

Recycling means recycling the product into new materials or fibers. The concept of recycling includes two meanings as downcycling or upcycling. Downcycling means that some of the value of the product is lost and its quality is lower than that of the original material. Upcycling, on the other hand, means higher quality of the product and increasing the value of the product through design. (Niinimäki, K., 2013:18)

Upcycling in terms of clothing design; is the application of creative ideas for the reuse of products. The natural dyeing and printing technique applied to used clothing is among the practices that represent upcycling and support sustainable clothing design.

The following items can be mentioned for the sustainability gains of the products, which are upcycled with eco print method and whose lifecycle is extended;

- Extending the life cycle of garment for an extra 9 months can reduce carbon, water and waste footprints by 20% to 30%,
- Reducing new clothing production 5% by increasing first use, reuse and repair times will provide environmental benefits equivalent to 20 tons of greenhouse gas emissions,
- If the number of times a garment is worn doubles, greenhouse gas emissions will decrease by about 44% compared to the production of a new garment (Botta, V. and Cabral, I., 2021:8).

Improvement techniques applied on garments that are considered to have completed their life cycle increase in direct proportion with the consumer's awareness of sustainability. As Türkmen states, these methods include reshaping, stylization, embellishment and printing techniques to give an added value to old, stained or damaged pieces and give life to them. The garments that are reshaped and worked on are restyled as unique pieces that contain manual labor (Türkmen, N. 2009: 90).

The ecoprint technique, which is within the scope of the principle of reuse, which is one of the basic rules of the concept of sustainability, is an environmentally friendly approach that extends the service life of clothes. Natural dyeing and printing methods make a significant contribution to reducing the environmental burden by enabling the reuse of clothing.

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The eco-print technique directs the producers and consumers to offer solutions for excessive consumption, uncontrolled clothing waste and social negativities. Natural dyeing and printing methods, which extend the life cycle of clothing, which are called as an user waste, with aesthetic and environmentally friendly approaches, are being reconsidered.

In this study within the scope of the principle of reuse, which is one of the basic rules of the sustainability concept, the ecoprint method, which is an environmentally friendly approach, is explained for the reuse of waste clothes after consumer use. With the ecoprint method, completely different, original and unreproducible patterns were applied to the clothes that became waste after consumer use, such as faded or stained clothing. In this way, it has been possible for the apparel and fashion industry to transform and reuse waste clothes into unique and original products with an environmentally friendly approach.

Application of Ecoprint Technique to Garments That Have Become Waste After Consumer Use

Eco print techniques, which are applied to garments that have become waste after consumer use, are considered as a design activity that emphasizes reuse within the concept of sustainable fashion.

It can be said that natural dyeing methods, which have been used traditionally from the past to the present, are being questioned and reviewed today, and some applications have turned into innovative approaches supported by technological developments. In this context, the use of natural dyes and renewable natural resources such as plants in coloring/patterning is a very interesting method in the textile and fashion industry in terms of both its environment friendly aspect, aesthetically and artistically unique print designs. All over the world, there are intensive researches on the revival of natural dyes, their widespread use and finding new sources (Özen, İşmal, 2021: 110).

In this part of the study, the ecoprint technique, which extends the life of the garments that have become waste after the consumer, is explained. The students of Ege University Faculty of Fashion and Design, carried out their studies within the scope of the course they took on natural patterning techniques in 2022. Each student emphasized the recyclability and reusability of shirts and t-shirts in their sustainable fashion projects.

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Figure 1. Ecoprint studies carried out in Ege University, Faculty of Fashion and Design, Natural Patterning Workshop.

Ecological printing (ecoprint) is a method of patterning various surfaces using natural materials, with different mordant substances, with techniques such as steaming, boiling, burying in the ground, and soaking in the sun. The mediators used to ensure that the dyestuffs bind to the fiber more strongly are called “mordant”. The pre-processing to dye the textile fiber with natural dyestuffs is called “mordanting”. As Karadağ stated, in the mordanting process in mordant dyeing, respectively; Add enough water to the dyeing bath to cover the textile fiber to be dyed. The amount of mordant is weighed and added to the dyeing bath and mixed. The mordanting bath is started to be heated, then textile fiber is added and heated at 80-100 °C for one hour. The fiber extracted from the mordanting bath is first squeezed and then left to dry in the open air (Karadağ, 2001: 145-146; Karadağ, 2007: 12).

In the ecoprint technique, the processes generally start with the preparation of the fabric for dyeing. Flowers and plant leaves are placed on the fabric. The fabric wrapped on a cylinder is covered with a film and tied tightly with a rope. Wrapped fabric is boiled and kept waiting. After the plant parts are removed from the fabric surface, it is dried. Alum mordant solution was used in the studies. The ground was colored with the tied batik method, and the ecoprint technique was applied with various leaves and flowers. Rose leaves, velvet oak leaves, pepper tree leaves and yellow flowers were used extensively.

In the ecoprint technique seen in the examples, the garments were mordanted with alum. The background of the worn and stained garments, which are white in color, is colored in light tones by natural dyeing method. Various leaves and flowers are placed on the front body of the garments, which are colored with the tied batik method. In order to obtain a symmetrical pattern, a composition was created with flowers and leaves on the half of the front body. The

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leaves were kept in vinegar water before the work. In the examples shown in Figure 4, the leaves were dipped in a mixture of iron sulfate and placed on the t-shirt. Shirts and t-shirts were folded from the vertical center axis and wrapped around iron cylinders. After being kept in boiling water for about two hours, the cylinders were taken out of the water. They were opened after cooling. The leaves were removed and the garments were left to dry.



Figure 2. The background of a faded, stained white cotton shirt was dyed with natural dyestuff obtained from pomegranate (*Punica granatum*) peel off before applying the ecoprint technique.



Figure 3. Front and back view of cotton shirt with ecoprint technique.

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Figure 4. The faded, stained white 100% cotton t-shirt is printed with Kasu Acacia (Acacia Catechu).



Figure 5. Cotton t-shirt samples with ecoprint technique.

Conclusions

In this study, individual application examples were given with the ecoprint technique. As part of the slow fashion and upcycling approaches, new suggestions were made to the users, and an activity proposal that could be developed within the framework of sustainable fashion was presented. It is thought that this study will guide future studies within the scope of the concept of sustainability in the ready-made clothing and fashion industry. It is seen that various projects

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are carried out by including sustainability in fashion design education in universities. In this regard, besides the theoretical education, the environment where applied design practices can be carried out should be provided to the students.

It is supposed that the outputs of sustainable fashion design concept can be transferred to environment and nature by using this natural methods.

It is important for sustainable fashion to create social awareness about extending the life of garments and to offer new suggestions. The intense energy and resources spent in the production of garments due to fast fashion lead consumers to develop new methods for longer use of garments. Ecoprint applications recommended in this direction offer effective solutions to extend the life of garments.

When the ecoprint technique is applied to stained, torn and ripped garments with a usage story, a new look can be given to the garment, and every practitioner can become a designer who creates his/her own fashion, as in sewing and repair techniques.

Natural dyeing and printing techniques applied to the garments after use create an opportunity for effective waste management without creating resource consumption. It contributes to the formation of social clothing culture by influencing consumers' clothing preferences, methods and durations. Therefore, ecoprinting applications offer strong alternatives to the fashion industry in terms of ecological sustainability, social/cultural sustainability and economic sustainability in terms of the positive effect on the lifespan of garments.

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