

RECYCLED TEXTILES IN SHOES: A REVIEW

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ABSTRACT:

This essay reviews recycled textile materials used in the production of shoes. The most crucial aspect of selecting a recycled material for shoes is to turn discarded textile materials into useful applications. Additionally recognised were the materials with the best comfort qualities. As a result, this review study is useful in understanding the types of recycled textiles and manufacturing processes utilised to produce shoes.

INTRODUCTION:

Clothing, accessories, and footwear are all made from a wide range of materials, both synthetic and natural. Here is a closer look at the numerous varieties of textiles that are utilised in footwear. Many fibre kinds, such as cotton, wool, nylon, polyester, polypropylene, rayon, and lycra, are used to make textiles for footwear. Each has a distinct appearance and set of physical characteristics, including as water absorption, stretchability, UV resistance, and colorfastness. Polyester and nylon are widely used in shoe design.

For shoes, textiles are a miraculous material. Textiles have a unique role in footwear design because of their endless array of weaves, colours, patterns, and unique characteristics. Footwear is responsible for somewhere between 16% and 32% of the total environmental damage generated by the fashion industry. Contrarily, footwear made of synthetic materials is made of plastic, while footwear made of textile materials uses a lot of water. After reaching the end of its useful life, a pair of shoes is usually disposed of in a landfill, where it may take more than a thousand years for it to disintegrate. Recycle the old textile material into usable additional apparel or footwear application to lessen the impact of both footwear and textile pollution.

The market size for sustainable footwear was estimated to be USD 7.5 billion in 2019 and is projected to increase at a CAGR of 5.8% from 2020 to 2027. Due to a number of factors, the market for eco-friendly shoes is expected to increase significantly in the near future. Increasing consumer awareness is a major driver for manufacturers to reinvent their product lines. Increasing number of youths globally, along with high spending power of this consumer segment, is projected to favour market growth throughout the forecast period.

Each year, more than 20 billion pairs of shoes are produced, producing an average of 14 kg of CO₂ every pair. The second-largest contributor to atmospheric CO₂ emissions is the garment industry. Around one-fifth (20%) of the climatic effect of the apparel industry is attributed to footwear alone. Almost 1.4 percent of global emissions are related to shoes. Although though this might not seem like much, it's astonishing that just one piece of clothing, which is meant to last us for years and hence have a reduced environmental impact, generates almost 700M metric tonnes of CO₂ annually.

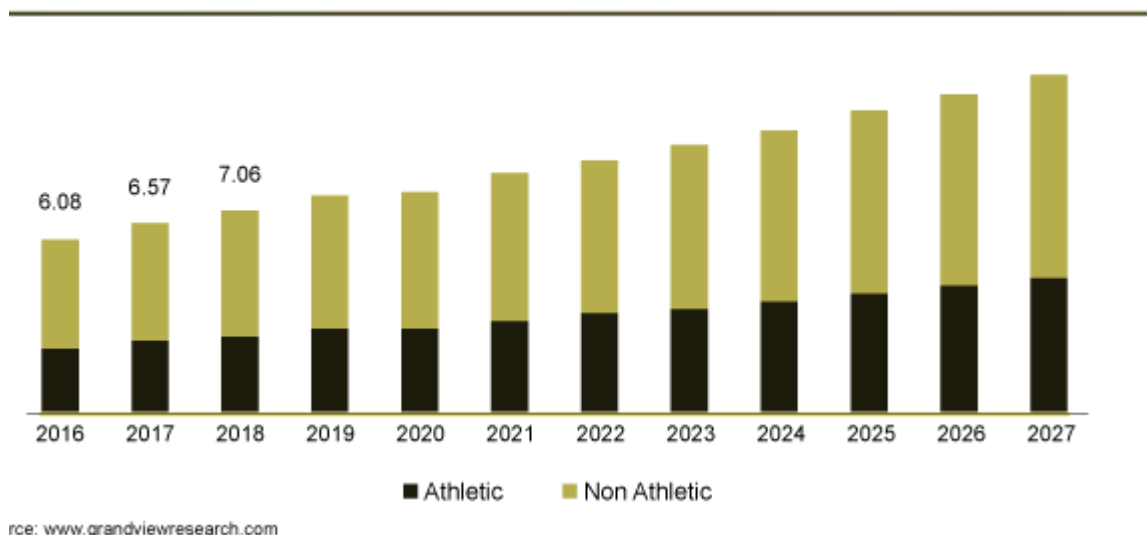
One of the main issues the market for sustainable footwear is facing is the lengthy production process. Even if it requires toxic chemicals in the manufacturing process, sustainable footwear normally is made of

materials that are inseparable and degradable. The cost of the raw materials used to make sustainable footwear is higher than the cost of the raw materials used to make traditional footwear. However, improvements in technology that allow for more effective fabric recycling are projected to bring down the price of acquiring raw materials in the near future.

In the foreseeable future, recycling is anticipated to remain the industry buzzword for sustainable footwear. For example, in April 2019, Adidas debuted its entirely recyclable Futurecraft Loop Sneaker line sporting a carbon-neutral aesthetic. This innovation was targeted at GenZ and Millennials who are aware of the concept of sustainability and prioritise it more than the previous generations. In 2016, Rothy's began making shoes out of used plastic bottles; today, the company is worth \$700 million.

Athletic and non-athletic footwear are the two types of footwear that make up the sustainable footwear market. The shoe business is adopting a new innovation as a result of the sustainability movement. The practise of conventional recycling, the usage of biodegradable materials, and the idea of eco-consciousness are growing in popularity.

U.S. sustainable footwear market size, by type, 2016 - 2027 (USD Billion)



ANATOMY OF SHOE:

A shoe is made up of several different parts. Certain phrases, like "sole," refer to components that are present in all shoes, whilst other names might only be applicable to a particular kind or design of footwear. A shaft and a base are the two fundamental components of a shoe, and they are united during shoe production.

The purpose of a shoe is to cushion and protect the human foot. They're frequently worn with socks. Moreover, shoes are utilised for both fashion and ornamentation. The design of shoes has changed dramatically through time and between cultures, with shape initially being connected to utility. The human foot can adapt to a variety of surfaces and weather patterns, but it is still susceptible to environmental risks like sharp rocks and harsh temperatures, which shoes guard against. Steel-toe boots, which are essential footwear at industrial job sites, are one type of shoe that is worn as safety equipment. In addition, numerous design details, such as whether shoes have very high heels or flat ones, have frequently been decided by fashion.

Style, intricacy, and price variations in modern footwear are enormous. Simple sandals with a thin sole and a single strap may simply cost a few dollars. Famous designers' high-end footwear may be fashioned from pricey materials, have intricate craftsmanship, and cost a lot of money. Some shoes have more specialised uses, such as sneakers that have evolved from a specific sport shoe into a general use shoe, while others have more universal uses, such as boots made specifically for mountaineering or skiing.

Shoes have traditionally been constructed of leather, wood, or canvas, but rubber, plastics, and other materials generated from petrochemicals are becoming more and more common. Because the materials are difficult to separate, recycle, or otherwise utilise, 90% of shoes end up in landfills.

SHOE UPPER:

The term "upper" refers to the complete portion of the shoe that covers the foot. The term "upper" refers to all parts or elements of a shoe that are located above the sole. The insole and outsole are then joined by stitching or, more often, by moulding to create a single piece. The upper of the shoe is made up of the vamp (or front of the shoe), quarters (i.e., sides and back of the shoe), and linings. One of a shoe's primary parts aids in keeping the shoe on the foot.

The collection of materials that make up the top of the shoe is known as the upper. Depending on the role of the shoe, fabric qualities like breathability, toughness, and water resistance change (i.e. casual, racing, trail running etc). To achieve a seam-free fit, the various components of the top may be stitched together or heated together with glue. Superior materials are used to create 'one-piece' uppers that do not have seams, such as Adidas' Primeknit and Nike's Flyknit. Several weave patterns are used in the construction of these uppers to offer a highly adaptable fit.

FUNCTIONS OF SHOE UPPER:

The section of the shoe above the midsole that encloses the foot, keeps the shoe in place, and shields the foot from dirt, rocks, and the elements is known as the upper, and it is held together by laces. It is far more stretchable. A knitted shoe upper offers significantly more stretchability compared to woven textile materials or other less elastic materials because of the textile structure produced by the interlaced stitches. Therefore, it might be preferable to limit the knitted material's stretchability for usage as a shoe upper.



SHOE UPPER COMPONENTS:

Toe

the shoe's frontmost portion. The toe region of the shoe is typically composed of a more durable material because it is more likely to be worn.

Vamp

Beginning behind the toe and continuing past the eyelets and tongue to the back of the shoe is the front portion of the shoe.

Tongue

The region between the bottom end of the shoelace and the top of the instep is referred to as the tongue in general. It is known as the tongue because of how somewhat similar its form is to the tongue. The main colour of the upper, the colour of the logo, or the colour of the shoelace will typically match the material colour of the tongue.

Collar

the quarter's top edge, where the foot is inserted. This is frequently cushioned for enhanced comfort.

Eyelet The lace-insertion holes on the eye

Under the lace holes, there are reinforcement components here. The lace holes are typically strengthened and shielded from being easily deformed by the laces' tension by an additional layer of eyelets on the outside of the shoe.

A shoelace is a strap that is used to secure the ankle, embellish the upper, fasten the inner and outer uppers of the shoe, and alter the elasticity of the shoe.

Quarter

Often, the rear portion of the upper starts where the vamp ends and wraps around the heel.

Counter

The back of a shoe is made of a piece of material that supports and stiffens the material surrounding the heel and aids in keeping the shoe's shape. The shoe's back is strengthened by the counter.

Lining

The interior of the shoe has a layer of liner to increase comfort.

TEXTILE MATERIALS USED IN SHOE:

Uppers can be made from a variety of fabrics, so it's critical to understand what each one is like. The most common fabrics used for uppers in terms of composition include Cotton, Polyester, Nylon, Propylene, Lycra, Wool, etc. There are numerous sorts of textiles used in shoe materials, depending on the weaving technique. Canvas, mesh, knitted materials, non-woven fabrics, etc. are frequently utilised.

The manufacturing of the upper is the most challenging step in the dozens of procedures required to create a pair of shoes.

There are many different kinds of fabrics, as well as a huge variety of raw materials, ranging from natural to synthetic fibres. Polyamide, polyester, and nylon are the most popular. But, we also notice that Lycra, Cotton, and Wool are used in respectable amounts.

Shoes are frequently made from textiles. Textiles come in a huge variety of colours and styles, much like leather. There are a variety of fibres, denier (or fabric weight), weaves, and knits that can be used in textiles.





The variety of styles and designs available for textile shoes is one of their main benefits. While deciding whether to own or use a textile, one must also take into account its physical characteristics, such as variances in breathability, support, and temperature management (ie. hotness or coolness).

RECYCLED TEXTILES USED IN SHOES:

Previously, it was difficult to get recycled shoes, but now both emerging and well-known manufacturers are releasing models made of recycled materials. One material worth mentioning is PET plastic, which is the material used to produce single-use plastic bottles. It can be melted down, spun into fibres, and woven into flexible textiles for use in footwear, apparel, and other items..





DIFFERENT TYPES OF RECYCLED TEXTILE MATERIAL INCLUDE:

Recycled Polyester

Shoes made from recycled polyester are strong and resistant to environmental elements like wind and water. They are also stain, rip, and wrinkle-resistant. Moreover, it is lightweight and shrink-resistant. Polyester's drawbacks include its inability to breathe, sensitivity to temperature, and flammability. Artificial polyester cannot biodegrade.



Recycled cotton

Pre-consumer waste, such as cotton fabric remnants from factories and other sources, is typically used to create recycled cotton footwear. Because recycled cotton biodegrades quickly, its environmental impact is reduced. With the exception of its flexibility, it is quite similar to pure cotton and has many of its characteristics. Recycled cotton shoes have a good impact on the environment since they reduce water waste and toxins because they aren't created from cotton plants. Yet, compared to its natural form, recycled cotton shoes are rather pricey. They are typically blended with polyester fibres or pure cotton. Frequently, less than 30% of the completed product is made of recycled cotton.



Recycled nylon

Since it takes a lot of energy to produce nylon from crude oil, recycled nylon can be created from pre- and post-consumer waste. The majority of recovered nylon textiles are created from trash like fishing nets. Unlike recycled polyester, recycled nylon may be recycled indefinitely and is more circular.



Recycled wool

The most recycled and reused fibre in the world is wool. Wool has a good impact on the environment since it can be used repeatedly before needing to be replaced. Wool recycling consumes less energy than is required. Wool recycling currently presents little difficulties, although understanding is required.



BRAND WHICH MAKES SHOE WITH RECYCLED TEXTILE MATERIALS:

1) Converse, Chuck Taylor, All-Star Crater – Recycled Cotton Shoes for Men and Women



Almost 40% of the bulk of the Converse Chuck Taylor All-Star Crater is composed of recycled materials. The entire midsole is made of Nike Crater foam, which contains 12% recycled rubber. Rubber is recycled and used in Nike Grind, which is made from leftover components from manufacturing.

Whereas the upper is made of a special substance called Morphlon and draws inspiration from Converse's Renew initiative. It creates a material with the appearance and texture of a traditional canvas by combining recycled polyester with waste fragments from the textile industry.

There are many colour combinations, including bespoke multi-color clothing in the most alluring Black Chambray Blue, Charcoal Chambray Blue, and White or Chambray Blue.

2) MOVMT Women's Le Fronck Vegan Casual – Recyclable Organic Cotton:

A surfer who was troubled by the amount of rubbish he saw in the water created The People's Movement, another socially aware company. The comfy and casual MOVMT sneakers are built from recyclable materials.

In order to combat the usage of single-use plastic, MOVMT makes stylish footwear and accessories that are also eco-friendly. They support organisations like 5 Gyres, which uses research and ocean cleanups to lower the amount of plastic in our environment.



The materials used to make MOVMT shoes are eco-friendly, including organic cotton canvas, recycled materials, and upcycled plastic bags. Bali's beaches are where the bags are collected. Furthermore used are recycled plastic fabrics, water-based glues, natural colours, treated shoelaces, nickel-free eyelets, and treated shoelaces.

3)Astral Recycled Shoes:

In 2002, farmer and entrepreneur Philip Curry founded Astral, a footwear firm that values social responsibility and the environment. After selling his initial outdoor equipment business to Patagonia in 1999, he took some time off before settling down to work as a full-time organic farmer. Philip considered the market for outdoor gear once more as he worked on his farm. He pondered how he can design footwear that would allow outdoor enthusiasts to enjoy nature with the least amount of negative environmental impact feasible.

Astral was Philip's second business, and it was founded with this in mind. He started by removing PVC foam from Astral's supply chain. After that, he added recycled materials like recycled polyester. Also, he decided to only create vegan shoes. Beautifully crafted, durable, and environmentally responsible shoes are the end result.



4)Reebok

Reebok has significantly improved in recent years when it comes to sustainability. The brand is now releasing a wide range of designs built from organic and environmentally friendly materials like natural rubber, algae, and eucalyptus bark. They are also using more recycled synthetic materials, such as recycled polyester.



5)Nothing New Recycled Shoes:

A new company called Nothing New creates traditional tennis shoes from recycled materials like fishing nets, bottles, cotton, and rubber. Even the laces are produced from recyclable materials.

CONCLUSION

Although the majority of recycled materials used to make footwear are already-existing ones like used tyres, jackets, parachutes, and fabrics from old car and bus seats, using pre-consumer garment cutting waste and polyester yarns made from recycled PET bottles allows for the creation of a product that is sustainable and has a significantly smaller environmental impact. One of the best things anyone can do for the environment is to purchase recycled shoes. Also These recycled products maintain the same value and quality as their non-recycled counterparts without sacrificing cost or comfort for fashion.

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