SUSTAINABILITY AND INNOVATION PRACTICES IN LEATHER AND FOOTWEAR INDUSTRY: A SYSTEMATIC CONTENT ANALYSIS

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ABSTRACT

The goal of sustainability is to satisfy current needs without jeopardizing the ability of future generations to satisfy their own demands. In the leather and footwear sectors, sustainability is defined as shoe design, development, manufacturing, distribution, and selling procedures that reduce the negative effects on the environment, conserve energy and natural resources, are secure for workers, communities, and customers, and are financially prudent. In this study, the scientific literature on innovation and sustainability in the footwear sector during the previous ten years will be analyzed. The study is in the descriptive and exploratory categories. The procedure produced 38 papers in the Scopus database and Google Scholar that matched the research topic. From 2000 to 2023, on the subject of leather and footwear, the bibliometric analysis identified the most pertinent papers, authors, keywords, nations, research institutions, and journals. For the purpose of bibliometric analysis, R Studio will be used. The leather and footwear industries must support each other in terms of innovation and sustainability, which we tried to find through a systematic literature review analysis. Innovation in the footwear industry is an important factor, and due to the reduction of raw materials such as leather and the negative impact of leather on the environment, the importance of sustainability in the footwear industry has increased.

Keywords: Sustainability, Innovation, Bibliometric analysis, Leather and Footwear Industry.

INTRODUCTION

Sustainability means meeting the needs of the present without jeopardizing those of the future by achieving a balance between economic development, environmental protection, and social well-being. Mankind is right now assessing the planet's resources and carefully considering what may be done to ensure that they are available in the future for environmental protection and social well-being. Mankind is right now assessing the planet's resources and carefully considering what may be done to

ensure that they are available in the future. The importance of trying to achieve the use of natural resources sustainably or to generate a minimum of consumption worldwide has been acknowledged on a global level. The consumer market today is more driven than ever by environmental concerns, which have a growing impact on the products that consumers choose. The greater cost of organic food in a number of nations indicates that some consumers are willing to pay more to feel secure about their purchases. The consumer market today is more driven than ever by environmental concerns, which have a growing impact on the products that consumers choose. The greater cost of organic food in a number of nations indicates that some consumers are willing to pay more to feel secure about their purchases. Since environmental pressure groups have been active and the internet has become more widely available, there is now more public awareness of environmental issues than ever before. Companies and organizations are currently thinking seriously about sustainability as one of the important concerns to address in business, perhaps first in response to consumer pressure. If the manufacturing materials and procedures employed do not have a negative impact on the likelihood that the same product will be produced in the future, a product can be considered to be environmentally friendly and "sustainable". Prior to being adopted as a new production paradigm, sustainable measures require large time investments in research and the development of technical and management abilities by the innovative agent. The expenditures associated with a company's efforts to be sustainable are expenses that it intends to recoup through the advantages of adoption [2,13].

The footwear industry is a multi-trillion-dollar industry worldwide. The footwear market, which is a part of the clothing and apparel sector, consists of shoes, sneakers, luxury footwear, athletic footwear, and sporting shoes, as well as other associated products. Leather, textiles, and a variety of synthetic materials are frequently used to make footwear goods. The value of the global footwear market in 2022 was predicted to be close to 382 billion dollars. The Indian leather industry's footwear category is a hugely important one; in fact, it serves as the sector's main driver of expansion. With 13% of the world's 16 billion pairs of footwear produced, India is the second-largest producer behind China. India manufactures 2065 million pairs of various types of shoes, including 909 million pairs of leather shoes, 100 million pairs of leather shoe uppers, and 1056 million pairs of non-leather shoes. India sells 115 million pairs annually. As a result, almost 95% of its output is used to satisfy domestic demand.

The footwear sector is expanding economically, so it is necessary to make the production process more sustainable. In regard to their influence on both economic growth and innovation, the leather and footwear industries are significant. Manufacturing footwear not only satisfies social and technological demands but also affects the environment. This may be avoided, but only if improvements are made to the process. Manufacturing and procurement of footwear raw materials are responsible for environmental pollution. Carbon, or petroleum, is used by manufacturers to run

their factories. Carbon dioxide and other greenhouse gases are produced when these fuels are burned. The atmosphere is then filled with these gases. Sustainable development in the shoe industry is defined by the FDRA as practices that minimize adverse environmental effects, preserve energy and natural resources, are secure for workers, communities, and customers, and are economically viable. The manufacturing process involves the use of chemicals, including adhesives and tanning chemicals, which may leak into the environment through the outflow from the factories; the creation of footwear takes a lot of water, roughly 8,000 litres per pair; and energy is heavily used by the footwear industry. Energy use in the footwear industry is significant. Footwear firms need fossil fuels, which release greenhouse gases, for everything from cultivating the crops to running the equipment they use. 1.4% of the world's emissions are attributed to the sector, according to Quantis research; the movement of shoes from manufacturers to retailers also contributes to pollution; and last but not least, the majorities of shoes are not recycled and end up in landfills. The footwear industry has a large societal impact as well. The majority of footwear is made in underdeveloped nations, sometimes at extremely cheap rates. Additionally, there are frequently poor working conditions in factories, and employees are required to work long hours in potentially hazardous situations. Some footwear companies have a history of using child labour in their supply chains. The communities where the factories are located become more impoverished as a result of all this.

In this context, this study aims to analyze the scientific literature on sustainability and innovation in the footwear sector in the last 22 years in order to identify how this sector—of greater incidence in the world—is treating and minimizing its environmental impacts while at the same time bringing innovations to its products. The study is divided into six sections; the first one comprises this introduction. The second presents the theoretical framework of sustainability, innovation, and environmental issues. The third establishes the research methodology used in this research. The fourth section reports on the results. The fifth section presents the discussions. Finally, we present the conclusions.

RELATION AMONG SUSTAINABILITY, INNOVATION PRACTICES AND FOOTWEAR INDUSTRY

Business sustainability is viewed as an important component of sustainable development, and then contemporary developments offer new evaluation standards in addition to the traditional ones. There is no other reason why this problem should be at the centre of sustainable development, than the idea itself. Even the founders of the sustainable development movement, such as Rachel Carson, faced harsh criticism for some successful innovations, such as DDT (dichloro-diphenyl-trichloro-ethane)[5]. It is difficult to promote a sustainable environment due to uncertainties. The solution to this problem is that bringing Innovation should produce economic results as well as a socially and environmentally positive environment at the same time. Sustainable development is a combination of technical and social changes

because these are all closely related. Innovation that enhances the ability to manufacture products and services sustainably and use sustainable business practices (Boons et al., 2013) When individuals and the organization as a whole insert and foster innovation, it has a tendency to develop, which in turn predicates the creation of positive innovation traits. Acc. to Dyer, Gregerson, and Christensen (2011) five skills that promote new ways of thinking encourage innovation.

Innovation that depends on a sustainable environment, such as eco-innovation and environmental innovation (Carrillo-Hermosilla et al. 2010), the terms "eco-innovation" and "eco-efficiency" refer to practices that come about as a result of the fusion of the economic and social facets of sustainability. Eco-efficiency is a practice that sits between the environmental and economic foundations. This requires creating products and services that serve human needs at affordable prices while progressively lowering environmental consequences to a level that the Earth can support [3]. Eco-efficient improvements, for instance, extend the lifespan of the product and reduce the amount of resources and energy used to produce each unit. However, they may result in unemployment, skill extinction, community harm, or societal issues, as well as social groups. Therefore, eco-efficient innovation needs to take into account the impact on society in order to be considered sustainable innovation [10] However, various definitions and meanings are available in different contexts, and the word "eco-innovation" has been used more frequently in environmental management processes by businesses and governments[33,12]. In this way, it's crucial to grasp how eco-innovations are classified in order to fully appreciate their qualities and transform them into effective traits for the sustainable business sector [12].

In the past few decades, the importance of sustainability has increased in all commodity sector (Brunetti et al., 2013). and, in particular, in the footwear industry (Lopes et al., 2015), where many interventions have been carried out to offer a concrete answer to the need to adopt sustainable practices like reducing the number of substances that are usually used, reducing the amount of sound that produce by plant & machinery, increasing energy efficiency, improving the working conditions for those who design or produce shoes, or manufacturing footwear, etc.((Tartaglione and Corradini, 2013). For the purpose of defining innovation, especially eco-innovation, Christensen [6] provides a contrast between radical and incremental improvements, which are: (i) Incremental adjustments are improvements that are made gradually and continuously to competencies and modifications that preserve and sustain current relationships while adding value to the existing framework in which innovations are rooted; (ii) Radical changes, on the other hand, are discontinuous modifications that aim to replace current structures and elements and/or the development of new networks as a substitute for competencies.

RESEARCH METHODOLOGY

This research is characterized as theoretical in nature. As for its technical procedures, it corresponds to a bibliographic study, as we address data and verifications stemming

directly from previous literature on the subject. The perspective's objectives are classified as exploratory and descriptive, since they seek specific information and characteristics of what are being studied [11]. A research technique called content analysis is used to find specific words, themes, or concepts in a given set of qualitative data, such as text. Researchers can quantify and examine the occurrence, significance, and connections of these particular phrases, topics, or ideas using content analysis. For example, researchers may evaluate the vocabulary used in an article in order to search for prejudice or partiality. The meanings included in the texts—the author(s), the audience, and even the culture and time period surrounding the text—can all be inferred by researchers.

In the Scopus Database, the terms "sustainability," "innovation," and "leather and footwear industry" were defined. It includes all of the searches that turned up 86 articles over the previous 23 years that dealt with the subject. These data were divided into different research areas: 54% were related to environmental science, 37% to energy, 35% to business and management, 34 engineering, and 29% to social science and others shown in the figure one. However, because there are more articles in Sustainability with different sector but as per the requirement of research we include only Footwear and leather industry in relevant domain as indicated in Figure 1, our analysis concentrated on the environment, business mgt. and economics domain.

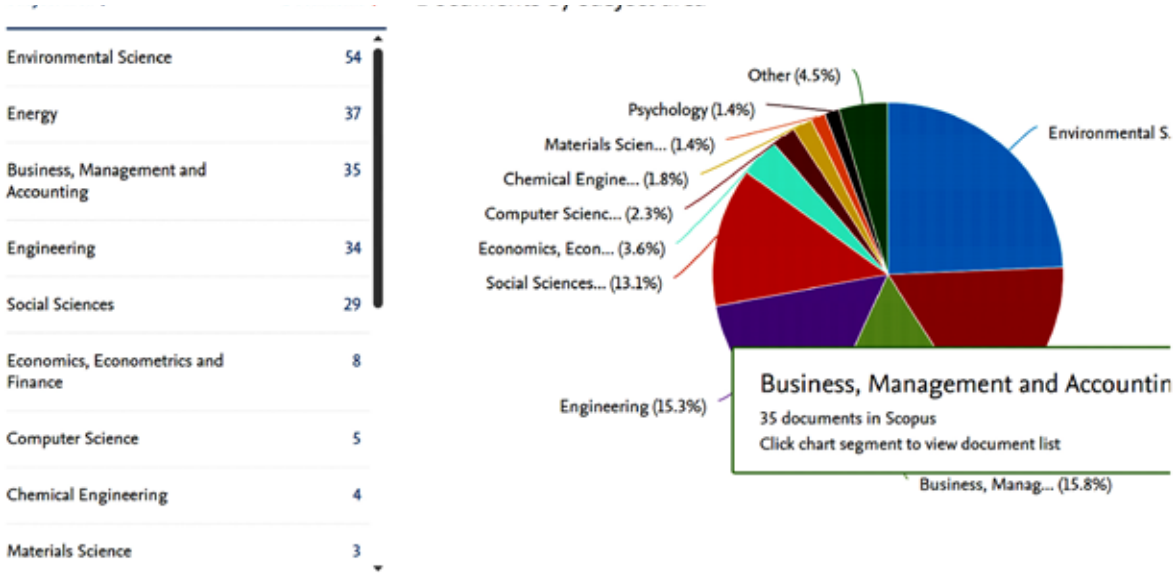

Figure 1: shows subject area classification.

A total of 30 papers were filtered repeatedly until the results were closer to the objectives of our research. The full-text reading of publications that don't contribute to the goal of our study is done without using up needless time thanks to these filters, which also serve to improve the research process. Some

factors were taken into consideration during the screening process: (1) The existence of duplicates or duplicate articles (2) Alignment with the footwear industry in the business and management sectors Journal articles are item numbers (3) for matching the article names and abstracts to the central idea and (4) for the accessibility of full-text articles. In order to add additional research, exploratory research was conducted with the search terms in Google Scholar at this point. There were a total of eight research papers that were not included in the SCOPUS database. The following papers were selected to make up the bibliography of our review: The list of publications linked to the theme "Sustainability and Innovation in the Leather and Footwear Sector". These papers will be evaluated through bibliometric and content analyses.

Figure 2: World cloud made by R studio.

Bibliometric analysis is a technique for identifying significant authors, journals, and keywords on a specific subject. Uriona Maldonado, Silva Santos and Santos [29] argue that these strategies are devices that rely on an analytical conceptual basis that is technically accepted, allowing the use of applications for methods to analyses information obtained and stored in databases. For the management and tabulation of the collected data, R Studio was used in the study. R Studio is software used to create bibliometric networks using information collected from bibliographical databases like Scopus and Web of Science. The application gives the user the option of using either the total or fractional counting approach [30]. This is using the graphical present relation of the author, relevant source plots, and thematic map analyses for the present research.

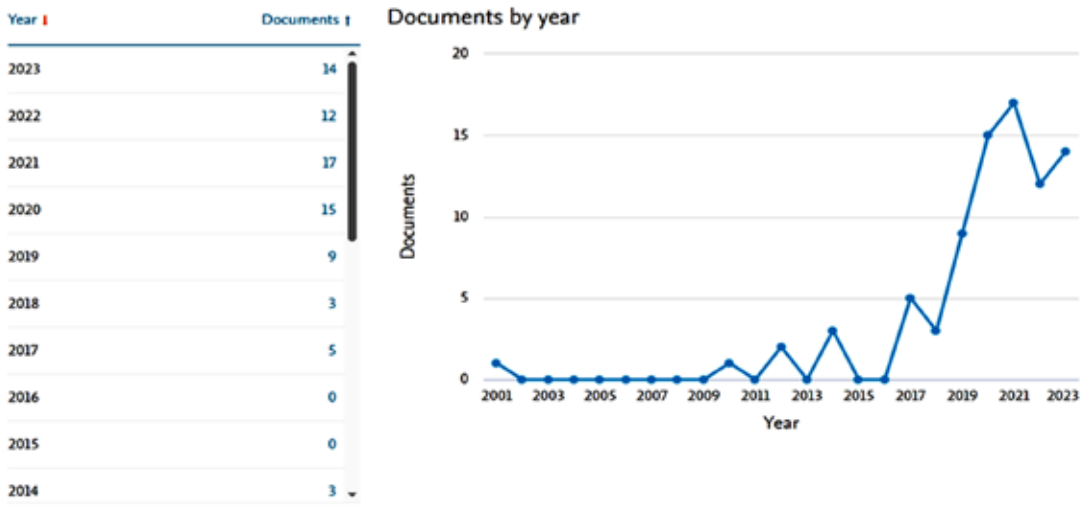

Figure 3: shows the chronological distribution of the articles

Above Figure no. 3 shows that in few decades, the importance of sustainability in footwear or other fashion industry Increased and which increase the scope of researchers to do work from the year 2019 to 2023 there were 67 app research papers written in this domain.

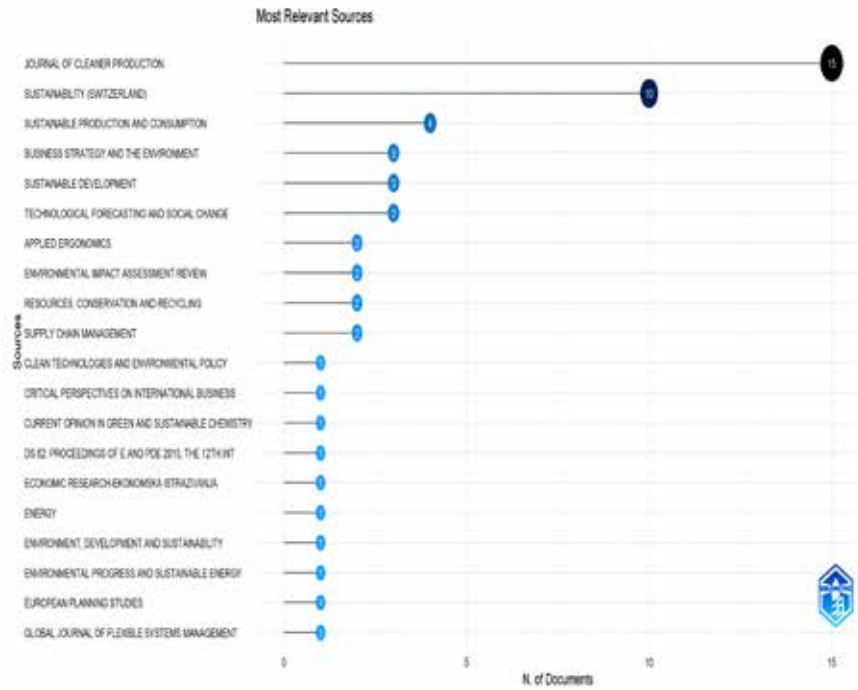

Figure 4

Source: Fig. 4 Scopus Database and analyze by R studio.

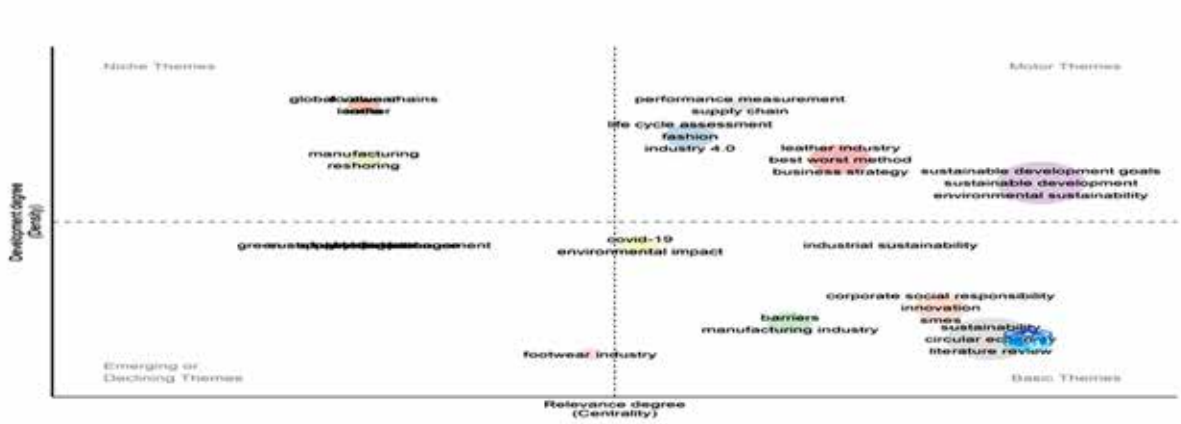

Figure 5: Thematic Map by R studio

Figure 5 shows Thematic Map in particular domain and divide into four parts Niche themes, Basic, Emerging and Motor themes. Emerging themes show less centrality, are less impactful, and show that with more research done in this domain (footwear industry), there is no relevance to doing research with keywords like "footwear industry." Niche themes show high centrality but are less impactful, as does the motor theme, which shows doing work in this domain, i.e., sustainable goals or development with the leather and footwear industry as per the taken data, The basic theme shows the upcoming trend of keywords in this particular domain.

RESULT AND DISCUSSION

The researcher's first step towards conducting a study and increasing their expertise in a particular area is to do a literature review. Additionally, it provides an introductory viewpoint for the creation of a study and describes all of the available scientific knowledge. Additionally, it increases the researcher's familiarity with the issue, enabling new definitions and constructions. The reader is informed of the findings of other studies that are directly relevant to the work being done and or being researched, according to Creswell [8], which supports this statement. This action encourages more discussion about the topic, adding to the body of knowledge, bridging gaps, and expanding earlier research. According to Lacerda [19], as information systems have advanced, using databases (indexed systems) has made it easier to find references and build theoretical frameworks for new research.

Diniz et.al (2015) several aspects of innovation were examined separately and in pairs using the survey findings, which were collected from Statistics Portugal. The lack of a culture that values innovation was noted as a major accomplishment. Innovation was mostly found in the product and process aspects. Additionally, it was established that when businesses adopt an innovation strategy, it typically manifests across multiple dimensions. Macchion et. al (2017)…A survey of significant Italian fashion enterprises was performed for the report, which focuses on the fashion sector. The major findings of the study unequivocally demonstrate the

beneficial effects of these practices on innovation performance. The study also establishes that globalization has a moderating influence on the relationship between innovation performance and the sustainability of the environment. According to this viewpoint, one of the most challenging industries is the fashion industry (Caniato et al. 2011). Industry scandals involving sustainability have, in fact, damaged the reputations of companies like Nike, Levi Strauss, Benetton, and Adidas (Seuring and Müller 2008). For developing nations like Bangladesh that want to become sustainable in the leather sector, the solid waste produced by the industry is an important issue for the environment. Aside from having an extreme socioeconomic impact, improper management of such hazardous leather solid wastes (LSWs) has a negative impact on public health. Therefore, regulating such LSWs is crucial for preserving the environment and enhancing socioeconomic conditions. In this sense, ecologically acceptable as well as economically advantageous energy generation methods include biogas and biofuel [22]. Manufacturing leather not only satisfies social development needs but also advances the world economy [16]. According to reports, processing a tonne of wet salted hides or skins can result in 200 kg of finished leather, 350 kg of non-tanned solid waste, 250 kg of tanned solid trash, and 200 kg of wastewater waste [20]. About 6 million tonnes of solid waste get generated every year in the global industry of leather processing [23], while China and India manufacture the majority of that amount at individual rates of 1.4 million tonnes [37] and 150,000 tonnes [17] respectively. However, similar tanned particles contain quantities of acids, alkalis, salts, heavy metal ions, and collagen that endanger the environment, human health, or squander available resources. As a result, the literature identifies many workable strategies for preventing and reducing pollution from leather solid waste and using resources that are urgently required [19]. The treatment or utilisation of these solid wastes has been the subject of numerous studies, some of which have been previously reviewed, such as Rouse et al.'s summary of keratin-based biomaterials for biomedical applications [24]. The dissolution, extraction, and biological applications of keratin were first described by Shavandi et al.[27] and investigated several techniques for recovering and using portentous wastes from leather production that have been chromium-tanned[26].

According to the HDFC Banking and Investment Advisory Group's (2018) research on the footwear sector, the Indian footwear industry is claimed to have played an essential part in the economic growth of the nation. As the world's second-largest buyer of shoes, India beat the US in 2017 (Gupta and Kaur). It produced 9% of the 22 billion pairs produced annually in the world (Bata India 2019) . But according to Sawalha et al. (2019), water reuse, the environmental impact, and de Aquim, Hansen, and Gutterres (2019), the leather industry is having issues with wastewater processing and tanning. The adoption of I4.0 technology by the footwear industries in developing countries like India has increased recently (Majeed and Rupasinghe 2017). However, organisations are constantly having trouble keeping up with the rapid changes in popular sectors, including sports, health, clothes, and accessories [34]. As a result, it is

necessary to identify the obstacles to sustainable I4.0. I4.0, which establishes a working environment of integrated productivity between humans and robots, has a great vision of transforming the industry. The implementation of I4.0 in developing nations like India, however, requires consideration of sustainability. The study shows that mainly nine barriers are causal, while eleven barriers are in the effect group. The most significant barrier, according to the analysis of the finding, is "lack of new organizational policy". Therefore, it may be claimed that Indian organisations lack an effective plan to deal with I4.0 implementation difficulties. It could be argued that Indian organisations lack a suitable approach to handling I4.0 implementation difficulties. It could be argued that Indian organisations lack an effective approach to dealing with I4.0 implementation difficulties. Additionally, "SAMARTH (Smart Advanced Manufacturing and Rapid Transformation Hub (SAMARTH) UDYOG BHARAT 4.0") has been introduced by the Indian government, which may be a smart decision. Lack of client feedback and cooperation towards I4.0 and sustainable practices is the second important hurdle which shows that India are still not getting the working together and cooperating trick. Because India is a developing country, the third major obstacle is the "lack of infrastructure." technology, and resource transfer. Lack of support from management, which can provide both financial and emotional backing for I4.0 adoption, is the crucial barrier. Lack of financial support as implementing I4.0 necessitates significant investments in technology, resources, personnel, and procedures.

Innovative path and sustainability by Footwear Firms

One of the oldest shoe companies in the world took a risk by introducing the Jazz Court RFG, their most environmentally friendly shoe to date. There is zero plastic in the universal silhouette. Instead, it is built entirely of seven natural components and nothing else. Durable rubber serves as the sole, wool serves as the insole, eucalyptus fiber serves as the material for the shoelaces, and cotton and jute serve as the material for the top. Gardenia flowers and beets were employed as coloring agents, and the latter was also utilized to make the ink required to stamp the sizing information on the labels of the insoles. The Swedish shoe company Icebug uses surplus wool from neighboring Wool power's regional production in the north of the country for their sneaker Eide. Wool's inherent characteristics offer it remarkable thermoregulatory abilities, including the ability to be chilly when it's warm and warm when it's cold. Furthermore, Icebug claims that the super-comfortable design is a result of the soft and cozy upper and the BUGforce EVA midsole's BLOOM foam, which is made up of algae biomass. Other environmentally friendly features of the Eide include a partially recycled rubber and wool liner in the outsole, and recycled polyethylene and fishing nets in other areas.

Fast fashion items create 10% of all human carbon emissions and are promptly disposed of in landfills. Instead, choose eco-friendly, slow fashion that honors the natural world's elements. It's time to stop supporting the synthetic footwear business, which uses tons of water and other resources and harms the

environment's basic foundation. They engage in unethical production and the exploitation of workers in third-world nations, which we should avoid. By going deeply into nature and discovering a more sustainable method of producing shoes, we may interrupt this cycle of unending pollution and environmental harm. It's time to reflect on our decisions. It's time to alter the status quo. With this goal in mind, Neeman's has developed natural footwear alternatives made of materials like merino wool, which is known for its renewability, unrivaled comfort, breathability, and light weight. Sheep husbandry has a reputation for using hazardous methods and abusing animals. Neeman's, however, takes a fresh and responsible stance on it. Neeman's Footwear assures that all sheep farms strictly conform to the highest ethical standards and produce wool that is not mulesed. Neemans undertakes a new project with the utmost dedication to preserving the integrity of the environment. Neeman's is the Indian shoe brand who offers the first-ever environmentally friendly green footwear while the entire world focuses on saving the environment. Neeman's reduces carbon footprints by using organic and ecological materials. In addition to being of the highest quality, the materials used for the packaging, insoles, and soles are also all environmentally friendly. Neeman's is credited with coming up with the idea to introduce previously unheard-of and unexplored materials and for managing research and development. Quantis, a sustainability consulting firm, states that studies reveal that the manufacturing of sneakers is responsible for 1.4% of the world's greenhouse gas emissions. And let's not overlook the fact that India ranks as the world's 15th worst polluter of plastic. Neeman Company has brought a number of ground-breaking fibers to the Indian market. Merino Wool Sneakers, the finest and softest wool produced by Australian Sheep, served as the starting point for the adventure. They are suitable for wearing throughout the year. People have valued eco-friendly pairs created from environmentally hazardous components and fibers that are natural. This response suggests that Indian consumers are receptive to comfortable and environmental footwear.

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