A Bibliometric Analysis of Eco-Fashion

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This research aims to look at the development of research on "Eco-Fashion" throughout the world and research plans that can be carried out based on journals published on this theme. This research uses qualitative methods with a bibliometric analysis approach. The data used is secondary data with the theme "Eco-Fashion" originating from database Scopus with a total of 133 journal articles. The research results show that in the author's bibliometric mapping, the author whose research was most cited on the theme Eco-fashion is Niinimäki. Furthermore, based on bibliometric keyword mapping, six groups can become lines of research with topics related to (1) Circular Economy Adoption, (2) Impact of Knowledge on consumer sustainability, (3) Green Energy Challenges, (4) Sustainable Raw Material Changes, (5) Fashion Product Values, and (6) Friendly Label Effects on Environment.

Keywords: Eco-Fashion; Sustainable Fashion; Research Map
INTRODUCTION

The Creative Economy Agency states that the economy of Indonesia is dominated by three sub-sectors of the 16 creative sectors in Indonesia. The culinary sector dominates the first subsector at 41.96%, then fashion provided the second largest contribution, amounting to 18.5%, and the handicrafts sector amounting to 15.70%. Apart from contributing to Gross Domestic Product (GDP), the creative fashion industry is one of the highest creative economy export industries in Indonesia, namely 56% (Directorate of Creative Economy Research and Development, Deputy for Educational Research and Development, Creative Economy Agency, 2017). This shows that fashion makes a significant contribution to the development of the economy and creative industry in Indonesia, with its high level of consumerism.

The creative fashion industry is said to be a significant contributor to environmental damage due to the traces of pollution it leaves at every stage of the fashion product cycle (Claudio, 2007; García-Torres et al., 2017). Binet et al. (2018) stated that the development of the fashion industry will continue to grow until 2030. It is estimated that this industry will grow by 50%, resulting in carbon emissions of 2,791 tons, and the waste produced will reach 148 tons. This fact motivates various business actors in the fashion industry abroad to strive to reduce water pollution levels by up to 50%. It has the possibility of implementing chemical and textile waste processing schemes.

Knowledge about environmental sustainability can be seen through changes in more environmentally friendly behavior, such as cycling to work, recycling behavior, and responsible consumption behavior (Meulenberg, 2003). Rosadi (2021) states that only 28% of Indonesian consumers really understand sustainable products, meaning that most Indonesian consumers need help understanding sustainable products, one of which is sustainable fashion (sustainable fashion). This lack of knowledge about sustainable fashion will push the consumption of sustainable fashion products in a negative direction (Han et al., 2017).

Eco-fashion is a concept that involves deeper thinking about the environmental impact of clothing products, from production to use and, finally waste processing. The concept aims to reduce the fashion industry’s frequent ecological footprint linked with pollution, waste of natural resources, and unsustainability in clothing production. According to the International Standards Organization, Eco mode means: 'Identifying the general environmental performance of a product within a product group based on its entire life cycle to contribute to major environmental improvements and to support sustainable consumption patterns' (Luz Claudio, 2007). When it comes to purchasing environmentally friendly products, consumers disproportionately prefer the aesthetics and attractiveness of clothing, and they also attach importance to ethical clothing (Shaw et al., 2006).

Rosadi (2021) explains that 28% of consumers who know sustainable products will be willing to pay a higher price if they believe in the sustainability of the product. Therefore, if consumers believe that a product is sustainable, then consumers want to contribute by purchasing that product. Essentially, consumer preferences for eco-friendly fashion reflect increasing awareness regarding individual purchasing decisions regarding how products are produced, what materials are used, and their impact on the environment and local communities. This not only helps protect the environment but also supports ethical and responsible production practices.

The research results of Wang et al. (2019) argue that purchase intention is not only determined directly by consumer knowledge but there are also intermediary variables that are needed to encourage consumer knowledge so that it can turn into something purchase intention. The variable referred to by Wang et al. (2019) is trust. Trust is a significant predictor of positive marketing outcomes, such as loyalty, customer retention, and purchase intent. Therefore, it is essential for companies to build relationships of mutual trust with their customers (Neumann et al., 2020).

Using the information provided above as a foundation, this study will further examine consumer knowledge of eco fashion, consumer preferences for eco fashion, factors that affect consumers’ decisions to purchase environmentally friendly items, and how the fashion industry and brands have changed. When customer preferences change. Additionally, it will show how customer preferences for eco-fashion affect the entire fashion sector.

This research was conducted to complement existing research, fill the gaps in previous research, and expand the literature related to eco-fashion through research channels. Specifically, this research aims to see the development of "Eco Fashion" research throughout the world published by journals with this theme and see opportunities in the future by formulating a research agenda.
RESEARCH METHOD

As data sources for this study, a variety of international scientific journal papers on the topic of "Eco Fashion" were used. The method used to get the data was conducting an organized search of journal publications included in the Scopus database using certain keywords, including the term "Eco Fashion." Additionally, based on the gathered publishing data, scientific journals and articles that are pertinent to the research theme are carefully chosen. The existence of a DOI (Digital Object and Identifier) in these journals serves as the inclusion criterion in this selection process. With the use of specialized tools, data analysis was completed. 133 journal articles were published overall on the study topic of "Eco Fashion." Observations of publication trends related to this research topic were carried out using VOSviewer software, which allows the creation of bibliometric maps and more comprehensive and in-depth analysis.

The mapping tool VOSviewer is frequently known as VOS, which stands for Visualizing Similarity. In earlier studies, bibliometric representations have been created using VOS mapping techniques and subsequently examined. Also available through VOSviewer are keyword maps based on co-occurrence data and maps of journal authors based on co-citation data. This research involved an investigation of journal maps related to "Eco Fashion," which contained maps of authors and keywords, which were then examined to identify the study's route. Other research using bibliometric for the example can be found at Nasution et al., (2022), Gunawan (2023), Uula & Ikhwan (2022), Fitria et al., (2022), Sari & Maysyaroh (2022), Nuraini (2022), Kholiq et al., (2022), and also research done by As-Salafiyah (2022).

RESULTS AND DISCUSSION

This research discusses the topic "Eco Fashion" using 133 journal articles that have been published and registered in Scopus, which is analyzed on September 5 2023. Bibliometrics is a method used to measure and evaluate scientific performance by considering factors such as citations, patents, publications, and other more complex indicators. Bibliometric analysis is used to evaluate research activities, laboratories, and scientists, as well as the performance of countries and scientific specialties. Several stages in bibliometric analysis include identifying the research background, collecting the database to be used, and determining the leading indicators used in the research.

This section will deepen the results of the meta-analysis by displaying a visual mapping graph depicting 133 related journals "Eco Fashion." In this research, mapping was carried out by analyzing keywords and essential terms contained in journal articles. Mapping is the process of identifying knowledge elements, configurations, dynamics, dependencies, and interactions between these elements. Network visualization results from 133 journals with themes "Eco Fashion" will be explained and developed in more detail in the next section.

Author Analysis

Table 1 Author Analysis

<table>
<thead>
<tr>
<th>Author</th>
<th>Citation</th>
<th>Organization</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niinimaki k.</td>
<td>260</td>
<td>Aalto university, school of art and design</td>
<td>Finland</td>
</tr>
<tr>
<td>Mcrell L, Moore r</td>
<td>228</td>
<td>Department of marketing, NZ university</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Cervellon m, Carey L, Harms t</td>
<td>162</td>
<td>International university of Monaco</td>
<td>Monaco</td>
</tr>
<tr>
<td>Chan t, Wong c.w.y</td>
<td>148</td>
<td>Business division, Institute of textiles and clothing the Hong kong polytechnic university</td>
<td>Hongkong</td>
</tr>
<tr>
<td>Wiederhold m, Martinez I,f,</td>
<td>136</td>
<td>Marketing and strategy, Nova school of business and economics</td>
<td>Portugal</td>
</tr>
</tbody>
</table>
The table above shows the number of research publications by each author that are relevant to eco-fashion. This data displays a list of the names of authors who publish in journals with the most citations. Writer (Niinimäki 2010) is a writer who is in the top position with a total of 260 citations on research topics regarding eco-clothing, consumer identity and ideology.

Bibliometric Author Mapping

By using bibliometric analysis using VOSviewer software, researchers can map authors who contribute to the field "Eco Fashion". The resulting image provides a visual representation of the mapping, where the size and brightness of the yellow dots indicate a higher number of journal publications related to the “Eco Fashion” theme have been published.

![Bibliometric Author Mapping](image)

**Figure 1:** Bibliometric Author Mapping

The number of journal papers each author has published around the topic of "Eco-Fashion" is indicated in the image by the yellow color. More publications on that subject by the author are indicated by larger, more brighter dots.

The level of cluster density on the bibliometric map is shown in the image above, and it is explained that this density relies on how strongly the yellow color is apparent. The number of publications is depicted on this map in yellow. As a result, this part is crucial to comprehending the fundamental design of bibliometric maps, which is thought to be required for the analysis. Researchers can identify authors who have published the majority of their works from this point on.

Every writer or researcher generally exhibits a particular style with each publication of their work. A single author is represented by an author. The level of cluster density will be influenced by the author’s collaboration with other writers or researchers, and certain clusters exhibit a range of densities. Authors associated with rather big clusters can be found, nevertheless.

In comparison to writers who have lower cluster densities, this density demonstrates that these authors are the most productive in conducting research and publishing works on the theme "Eco Fashion." Other researchers could refer to these findings in the future.

Bibliometric Keyword Mapping

The keywords that exist in the research theme "Eco Fashion" are explained in the image below. In this picture, the words that are most commonly used in journal articles with a "Eco Fashion" theme are larger.
As for the mapping, the keywords that appear the most on the publication “Eco Fashion” is divided into 6 clusters, as follows:

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1 (32 items)</td>
<td>Adoption, aspect, business, case study, chapter, chemical, circular economy, climate change, clothing industry, company, concept, country, demand, energy, environmental impact, garment, issue, lack, number, process, production, recycling, resource solution, technology, textile, textile industry, use, waste, water, way, world</td>
</tr>
<tr>
<td>Cluster 2 (31 items)</td>
<td>Attitude, barrier, behavior, brand, china, concern, consumer, customer, data, eco fashion, factor, fast fashion, gap, group, interest, knowledge, marketing, participant, purchase intention, relationship, research, response, retailer, slow fashion, study, survey, sustainable clothing, sustainable fashion, sustainable fashion consumption, theory, trend</td>
</tr>
<tr>
<td>Cluster 3 (18 items)</td>
<td>Challenge, cost, eco, energy consumption, environment, framework, fuel consumption, information, model, nature, order, paper, part, service, system, user, vehicle, year</td>
</tr>
<tr>
<td>Cluster 4 (10 items)</td>
<td>Addition, article, attention, change, lipid, product, raw material, role, term, time,</td>
</tr>
<tr>
<td>Cluster 5 (6 items)</td>
<td>Appliance, case, fashion product, field, researcher, value</td>
</tr>
<tr>
<td>Cluster 6 (3 items)</td>
<td>Eco label, effect, india</td>
</tr>
</tbody>
</table>
Research maps that can be created are based on mapping 6 keyword clusters, namely:

**Cluster 1: Circular Economy Adoption**

The topic discussed in the first cluster is the adoption of a circular economy. Several studies that are relevant to this topic are: Ghisellini et al. (2016) Analyze how a circular economy might improve the effectiveness of resource use, particularly in the context of managing industrial and municipal waste, to establish a more stable and harmonious relationship between the economy, the environment, and society. The goal of this study is to ascertain how far a circular economy might mitigate the negative effects that traditional economic systems have on the environment. This is so that the circular economy, which transforms current business models into a proactive and regenerative eco-industrial development paradigm and promotes enhanced welfare by restoring environmental integrity, offers a considerably organized approach.

Lewandowski (2016) analyze how a circular economy might improve the effectiveness of resource use, particularly in the context of managing industrial and municipal waste, to establish a more stable and harmonious relationship between the economy, the environment, and society. The goal of this study is to ascertain how far a circular economy might mitigate the negative effects that traditional economic systems have on the environment. This is so that the circular economy, which transforms current business models into a proactive and regenerative eco-industrial development paradigm and promotes enhanced welfare by restoring environmental integrity, offers a considerably organized approach.

Bressanelli et al. (2018) demonstrates eight alternative technologically enabled possibilities to clarify the function of digital tools in promoting a circular economy in business models based on product consumption. This study also demonstrates how digital technology might circumvent the drawbacks of use-centric business models in implementing a circular economy, as found in other studies.

Yadav et al. (2020) establishing a framework to deploy solutions based on industry 4.0 and the circular economy to address difficulties in sustainable supply chain management. In this study, a distinct set of 28 sustainable supply chain management problems were discovered, along with 22 potential solutions. Elimination and Choice Expressing Reality (ELECTRE), a hybrid method that incorporates the best and worst ways of each, is utilized to evaluate the applicability of the created framework using an automotive case organization. Researchers studying sustainable supply chain management, industry 4.0, and the circular economy will find the findings of this study helpful. Additionally, practitioners can use prioritized solution stages to create powerful strategies to get beyond obstacles in the way of putting sustainable supply chain management into practice.

Huang et al. (2018) evaluating the reduction, reuse, and recycling (3R) philosophy as it applies to the management of Construction and Demolition Waste (CDW) in China. Investigating and analyzing current management policies and practices is required in order to determine how CDW might be decreased, utilized, and recycled. Regarding CDW recycling, the main obstacles include inefficient management systems, underdeveloped recycling technologies, limited markets for recycled CDW products, and nascent recycling market operations. To improve the current situation based on the 3R principles, various recommendations have been put forward. This includes developing effective circular economy models, strengthening control over CDW sources, adopting innovative technologies and market models, and implementing targeted economic incentives.

**Cluster 2: The Impact of Knowledge on Sustainable Fashion Consumption**

There is still not enough research discussing the impact of knowledge on sustainable fashion consumption. Several studies that are relevant to this topic are: Maldini et al. (2019) analyze of a case study on product personalization's effects on the durability, usability, and quantity of clothes. In an effort to close the information gap, the research introduction stresses the significance of evaluating the effects of sustainable design strategies on the quantity of clothing produced. This study offers a way to evaluate the effectiveness of this strategy and applies it to the particular setting of "product personalization," a tactic that is widely cited in the literature. This study also emphasizes the need for more empirical research to fully comprehend the effects of these and other design ideas targeted at prolonging apparel life, lowering production costs, and reducing waste in order to produce more effective solutions.

Min Kong dan Ko (2017) provides marketing insights into strategies to promote sustainable fashion consumption by studying consumer behavior in South Korea, China, and Japan. This research aims to gain a
deeper understanding of how consumers in the region make decisions regarding sustainable fashion, an area of increasing interest due to concerns about environmental impact. This study explores whether environmental awareness and product knowledge regarding Sustainable Fashion Products can drive their purchase, identifying factors that influence the intention to engage in Electronic Word of Mouth (eWOM), and examine marketing strategies and cross-cultural differences in the context of Sustainable Fashion Products.

Brandao da Costa (2021) quantifies the significance of different barriers associated with sustainable fashion consumption. This research combines six known main barriers, namely, knowledge of environmentally friendly clothing, perceived value, price sensitivity, product characteristics, diversity, availability, and skepticism, into the framework of the Theory of Planned Behavior (TPB). The aim is to investigate and reveal which barriers exert a more significant influence on TPB cognition and, as a result, play an essential role in shaping the intention to engage in sustainable fashion consumption. In addition, this research contributes to the growing literature on sustainable fashion by exploring the impact of various barriers to sustainable fashion consumption within an expanded SDG framework.

Wei and Jung (2017) was conducted with the aim of examining the influence of Chinese consumers' desire to maintain their reputation on their intention to purchase sustainable fashion products and how this moderates their commitment to sustainable fashion. The survey results confirm that saving face is a significant motivation for Chinese consumers to purchase products fashion environmentally friendly. Additionally, these factors were observed to mitigate the impact of overall product value while strengthening the influence of product environmental value in predicting purchasing behavior. These findings enrich our understanding of sustainable consumption in the context of Confucian culture.

Niinimäki (2010) aims to increase our understanding of eco-fashion consumption and how consumers make purchasing choices while forming their self-identity through external symbols, such as appearance, clothing, and item fashion. This research also adopts an interdisciplinary approach, considering eco-friendly clothing as a cultural and design element in a social and sustainable development context. These objects are seen as related to consumers' ethical beliefs and values and how their influence builds self-awareness through external symbols. Survey results from this research confirm that ethical commitment and ethical values strongly encourage the purchase of eco-friendly clothing, eco-friendly materials, recycled clothing, and ethically produced clothing. For "ethical hardliners," a personal solid ideology takes precedence in their purchasing decisions, even over their own identity or aesthetic values, especially when it comes to clothing.

**Cluster 3: Environmentally Friendly Energy Challenges**

Not enough research has been done on this. Several studies are relevant to this topic that is Mohanty et al. (2018) providing sustainable bio-composites from renewable resources: opportunities and challenges in the world of environmentally friendly materials. Eco-friendly materials are the wave of the future. There is great potential in the development of innovative bio-based products, but the main challenge lies in creating sustainable bio-based materials. Integrating biological resources into composite materials can significantly reduce our dependence on oil reserves. Bio-composites have the potential to complement and eventually replace petroleum-based composites in a variety of applications, offering new benefits for agriculture, the environment, producers, and consumers. Some crucial issues related to biofibers include increasing their reactivity through surface treatment, adapting bioplastics to serve as suitable matrices for composites, and designing appropriate processing methods based on the type of fiber form (e.g., chopped fabric, nonwoven/woven fabric, yarn, silver , etc.) to align with commercial interests and requirements.

**Cluster 4: Sustainable Changes in Raw Materials**

There is not enough research regarding sustainable changes in raw materials, few studies are relevant to this topic that is Doviet et al. (2009) focuses on "Energy for a Sustainable Future". show how policies can help advance and implement the technology and management techniques required for the shift to a more sustainable society. Today's civilization must deal with the difficulty of maintaining a sustainable energy supply while also attempting to reduce energy usage in order to combat climate change and preserve biological diversity.

Castro-Lopez et al. (2021) is to assess Consumers' Propensity Towards Sustainable Fashion Consumption, Their Perception of Value, and Readiness to Change Their Behavior. The fashion industry has had a detrimental impact on the well-being of fashion consumers by fostering an artificial sense of necessity,
newness, and disposability. This is exacerbated by linear production processes characterized by excessive consumption of energy and raw materials, as well as significant waste generation. Currently, the fashion industry is recognized as one of the sectors that pollutes the environment the most. However, there is increasing awareness among consumers regarding environmental and ethical issues, which is encouraging them to adopt more sustainable practices in their fashion consumption. Shifts in consumer behavior appear to be on the rise, and companies that implement sustainable policies may see potential gains in the short to medium term. The findings of this research validate the transformation of consumer consumption patterns, which shows an increasing trend towards sustainable fashion as an effort to protect the environment and community welfare. Consumers are also willing to pay a premium for slow fashion products.

Marques et al. (2019) presents and investigates the participation of two fresh fashion designers in the TAP-initiated Upcycling Project. According to this study, the fashion business has a huge negative impact on the environment and on the entire world. The fashion industry, which prioritizes sustainable product development, can use the circular economy framework as a guiding concept. It takes a creative design strategy to overcome the difficulty of converting waste materials into high-value fashion products. The fashion industry needs young designers to embrace the idea of a circular economy, and upcycling is the best way to complete the circle and lessen the industry's environmental effect. There are other viable and desired options that necessitate the investigation of novel methods and tactics involving all relevant parties.

**Cluster 5: Fashion Product Value**

Not enough research has been done on this matter. Several studies are relevant to this topic that is McNeill and Moore (2015) concern for the environment is evident in an increasingly environmentally conscious market. According to this study, customers’ propensity to spend extra money on ecologically friendly products is not well predicted by their level of eco-literacy. According to this survey, women, married people, and people who have at least one child living at home are more likely to be willing to pay more for ecologically friendly products. The analysis of the consumer profile of those willing to pay more for environmentally friendly items and the accompanying discussion of the consequences for marketers constitute the primary contributions of this research.

Laroche et al. (2001) explains how customers’ general concern for social and environmental well-being, their belief in sustainable fashion, and their history of ethical consumption behaviors all have an impact on how likely they are to buy sustainable clothes. Hemp, organic cotton, bamboo, and fabrics made from post-consumer recycled materials are among the sustainable materials used by many fashion makers. Additionally, they support ethical hiring practices and encourage the use of used clothing. However, some people may express reluctance to accept this change or may see obstacles to using products made using sustainable practices.

**Cluster 6: Eco-Friendly Label Effect**

The research discussed about eco labeling effects were not sufficiently found. Several studies that are relevant to this topic are: Banerjee and Solomon (2003) according to research, public initiatives have fared better than private ones, especially the Energy Star program. Private programs haven't really had much of an impact on the market when it comes to energy labeling for home appliances. The establishment of program credibility, financial stability, and long-term viability all depended on government backing. This study also emphasizes the value of focusing on particular product categories, statutory requirements, rewards, and cooperative partnerships as factors that contribute to program effectiveness. Complex information disclosure labels have been found to have less of an impact on customer behavior than simple logos and labels marked with approval.

Atkinson and Rosenthal (2014) explore which aspects of eco-label design produce more positive effects, using the numbers 2 (specificity of argument: specific versus general) × 2 (label source: government versus company) × 2 (product involvement: low versus high). These findings provide valuable insight into how eco-friendly labels are received and contribute to our knowledge of environmentally conscious consumption. The impact of the source of the eco label appears to be less significant than the specificity of the argument, at least when considered as a major factor. Label source only showed significance in predicting trust in environmentally friendly labels, where participants expressed greater trust in conditions sourced from the government compared to conditions sourced from companies. However, these effects vary depending on the level of product involvement. The interaction between source and product involvement was significantly related to ecolabel trust and attitudes.
toward the product and label source. Of the three dependent variables, we see that label source has a much stronger moderating impact in the low involvement condition compared to the high involvement condition.

Research on “eco-fashion” is an interesting and relevant field in the context of sustainable fashion and compliance with halal requirements in the fashion industry. However, as in many areas of research, several research gaps could be explored further. The gap seen in eco-fashion research is in halal eco-fashion, eco-cosmetics, and the Muslim community's perspective on halal eco fashion. Therefore, research is needed regarding halal eco-fashion in Indonesia.

CONCLUSION

This study aims to assess the current state of "Eco Fashion" research on a global scale. The study's conclusions show that 133 journal articles related to "Eco Fashion" are included in Scopus's index. According to the findings of the author's bibliometric mapping research, Niinimaki is the author who has written the most articles with the theme of "Eco Fashion". The theme is organized into six clusters based on keyword mapping, with the phrases "research," "value," "product," "production," "system," and "process" appearing most frequently. Based on commonly used phrases, it can be classified into six sets of study maps with the following topics: adoption of the circular economy, knowledge’s impact on consumer sustainability, green energy challenges, changes to sustainable raw materials, fashion product values, and friendly products. Evident gaps in eco fashion are halal eco fashion, eco-cosmetics, and the Muslim community's perspective on halal eco fashion.

REFERENCES


