

Independent designers and the future of sustainable fashion: A qualitative inquiry

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Abstract: This study aims to investigate how independent designer labels incorporate sustainable design methods into their products, thus allowing designers to contribute to the development of sustainable products. The study was conducted through qualitative interviews with eight independent designers in Beijing, China. The results were analyzed thematically to conclude how independent designers incorporate sustainable design methods into their designs and the challenges that independent designers face when practicing sustainable design and dealing with them. This paper explores the relationship between designers and sustainable design from three perspectives. Firstly, designers, as key factors in the transition of the apparel industry towards sustainability, have found from the concept and evolution of sustainable fashion that the right design approach plays a vital role in the environmental, economic, and social factors of the product cycle. Secondly, the researchers look at the perspective of independent fashion brand designers' labels, how they are confronted with sustainability issues, and how designers are improving, how designers are facing the challenges of sustainable design in the future, and how to integrate sustainable design methods into their labels.

Keywords: *Independent fashion designer, Qualitative method, Sustainable design, Sustainable fashion.*

1. Introduction

As the fashion industry is one of the worst offenders in terms of waste, water pollution, and carbon emissions, the environmental and social impacts have been under scrutiny, leading to a gradual shift towards sustainable design practices [1]. To address the issue of sustainability in fashion, Fletcher proposes sustainable methods such as zero-waste pattern design, up-cycling and biodegradable materials, which have become key strategies to mitigate these impacts. In the mid-nineteenth century, Charles Frederick Worth, the father of modern fashion design, pioneered the designer-led business model [2] which allowed independent clothing designer labels to gradually enter the public's view. Since then, independent clothing designer labels have become the centre of fashionable trends in the world and the wind vane that can guide the direction of fashion. At the same time, with the gradual increase in consumers' demand for fashion aesthetics, the demand for fashionable and personalised clothing styles and fabrics has also increased [3]. This phenomenon has led to the rapid updating and iteration of fashion brands' design products, resulting in excess inventory and piles of stock [4] and thus sustainable design has become a new issue in the fashion industry.

The World Conservation Society first explicitly proposed the concept of sustainable development in 1980, and people realised the importance of sustainability and turned it into a core value to lead future development [4]. With the increased awareness of sustainability, sustainable design has also emerged and spread to the fashion industry and has had a significant impact on designers of fashion design brands [5]. Research has shown that independent designers play an important role in promoting sustainability because of their ability to experiment with small-scale production methods [6]. For example, emerging designers adopt upcycling - a technique of upcycling and utilising discarded

materials into other high value products by reducing textile waste [7]. However, despite their innovative approaches, independent designers face significant barriers, including limited access to sustainable materials, high production costs, and consumer resistance to premium pricing [8]. These challenges demonstrate the need for an in-depth understanding of how independent designers can achieve sustainability with limited resources.

2. Literature Review

2.1. Influence of Designers on the Development of Sustainable Design

In today's fashion industry, designers are demonstrating their positive attitude towards sustainability through Eco-fashion and sustainable design to produce the most environmentally appropriate designs [9] making designers key players in sustainable Eco-design [10]. Independent designers play a key role as operators of small fashion businesses in all segments of the fashion industry chain. They are not only responsible for the design outcome of creative production, but also have the advantage of practising sustainable fashion models due to their unique position in the industry [11, 12]. In addition, these designers can play a leading role in spreading the idea of sustainability to the public through their innovative practices and giving new impetus to the fashion industry [13, 14].

"Eco-fashion" has become an important concept that encourages the need for designers to design fashion and clothing products in an ecologically responsible manner [15] and has become a sustainable theme for designers. Due to the growing need for sustainability in the fashion and clothing industry, designers currently still need research to help complete sustainable fashion design during the design process and have a responsibility to maximise the value of garments during their lifecycle as a way of considering all the environmentally related impacts of a fashion product throughout its entire lifecycle, from production to disposal [16].

Based on the practical issues of sustainable eco-modelling for sustainable development, designers can choose the materials and garment-related technologies to be used in their designs by focusing on human safety and environmental health. In addition, designers can also improve their capabilities in the design process based on past experiences and consumer demands, thus reducing fabric and garment wastage and therefore addressing the impacts of garment production on sustainable development. Impact of apparel production on sustainability [17].

2.2. Sustainable Process, Materials and Technology

In terms of sustainable fashion materials and technologies, by reducing the number of materials in the fashion ecosystem, fashion encourages people to extend the life cycle of garments more sustainably, thus reducing the negative impact on the world [18]. Designers play a role in influencing consumer behaviour and are responsible for improving the sustainability of fashion. They are accountable for influencing consumer behaviour and improving fashion sustainability [15, 19, 20, 21]. In addition, designers play an important role and make important decisions in the garment development process by using sustainable materials and technologies in design and production, resulting in improved clothing sustainability in people's everyday lives [18].

Loker [19] proposed Technology enabled sustainable fashion system, in which the recycling system is divided into five parts: Materials, Garment Design & Production, Distribution & Transport, Consumer Use, Disposal, Recycling, Reuse. Transport, Consumer Use, Disposal, Recycling, and Reuse, in which the selection of materials and technological improvements can extend the product's life, reduce product and waste, and thus increase efficiency. When designers consider sustainability in the design of their products from materials, technology, manufacturing processes, and end-of-life, the life cycle of the garment is greatly enhanced, resulting in increased sustainability and extended life cycles [15, 19, 20]. To understand what issues and shortcomings designers still have with materials and technology when designing their products, this study will conduct in-depth interviews with independent fashion designers. Gam, et al. [21] developed a cradle-to-cradle garment design model to address sustainability in the design process. From the practical aspects of sustainability, Jalil [22] developed a conceptual

Eco-fashion model which designers, as essential players in the life cycle of fashion products, can improve their ability to modify the design process based on their experience and consumer needs, as well as increase the utilisation of the design by increasing the functionality of the design during the design process, reducing the need to purchase unnecessary products and thus reducing waste [10].

3. Method

This study used a qualitative research methodology to conduct in-depth interviews with eight independent fashion designer labels, all of whom have more than 10 years of experience in the fashion industry as well as an in-depth understanding of sustainable design. Independent designer brand labels are a niche group in the fashion industry, and this study can be analysed more accurately through the qualitative research method, which transcribed and analysed the interview data using NVivo 14 software. These interviews were done through online and physical sessions in Beijing China, September 2024. According to the purpose of this study, the question list focused on the design process and sustainable fashion among the independent fashion designers. Firstly, the design methods used by designers in the design process were investigated and categorised. Secondly, what improvements and enhancements have been made to these methods during the design process. Finally, how designers understand and deal with sustainable design.

4. Results

Based on the interviews, the results show the designers' approach to sustainable design, development in the design process, and the challenges sustainability poses to independent designer labels. The results of the in-depth interviews showed as follows. As shown in Table 1, the eight interviewees are highly experienced professionals in the fashion industry, with over a decade of experience in either design, brand management, or both. This diverse and seasoned group provides a robust foundation for analyzing sustainable design practices, reflecting perspectives from various roles within the fashion sector.

Table 1.
Demographics of Interviewees.

No.	Expertise Area	Years of Exp.
I	Brand manager and product designer	10 years of management experience and 15 years of design experience
II	Designer	13 years of design experience
III	Brand manager and product designer	11 years of design experience and 7 years of management experiences
IV	Brand manager	Over 10 years of experience in the fashion industry
V	Designer	Over 10 years of design experience
VI	Designer	10 years of design experiences
VII	Designer	Over 12 years of design experience
VIII	Brand manager and product designer	Over 15 years of design and management experience

Table 2 shows that designers actively integrate sustainable innovation into their processes by adopting digital tools like 3D printing, CAD, and CLO. Efforts focus on choosing eco-friendly, high-quality materials, enhancing product technology to minimize waste, and improving consumer experience. These strategies demonstrate a comprehensive and evolving approach toward sustainable product development that balances innovation, material consciousness, and market responsiveness.

Table 2.
Sustainable innovation approaches and development.

Theme	Explanation	
Innovative Method	More than 90% of the designers mentioned sustainable innovative design methods such as 3D printing, 3D modelling, Computer-Aided Design (CAD) and CLO Virtual Fashion (CLO) in their design process. These innovative design methods are used in order to produce more efficient and sustainable products during the design process.	
Design Process Improvement	Improvement of Product Materials	All respondents agreed that, all things being equal, preference would be given to environmentally friendly materials, and that sustainable materials would be chosen within their means. They also try to use the fabrics left over from the product development process to continue other products, etc. They also choose materials that are as durable and high-quality as possible to improve their products. When selecting materials, we try to choose materials that have a high degree of durability and are of high quality, to increase the length of use of our products. In addition, in the early stages of design when choosing materials, designers will learn more about the factory's source information, such as in the selection of organic cotton, which is not the use of less chemicals and pesticides, so that the cotton production process will be healthier and environmentally friendly.
	Improvement of Product Technology	In terms of product technology, the use of technology will first put the product on the market, first look at consumer feedback, and then based on consumer feedback to continuously improve the product, and then based on the product to make the technology more comprehensive, so as to improve the quality of the product as well as the life of the product. And combined with the innovative methods mentioned above, the results of the design can be more rigorous reasoning out, so that it is not just a two-dimensional idea, but a more intuitive multi-dimensional, and can even participate in the manufacturing industry directly involved in the general of a three-dimensional data, then in the process of design and production, more able to better with the factory to do the docking to reduce the intermediate links produced by the unnecessary waste.
	Improve the Product Experience	The majority of participants (87.5%) indicated that improving the product experience is also an essential part of the product production cycle. The market launch of the product and the feedback from the consumers are used to judge the improvement and enhancement of the product in the next stage. One of the interviewees said that during the product development stage, they would do some runway shows or related promotions, which are not for the purpose of increasing production, but to let consumers have a better understanding of the product, so that they can consume more rationally and build up a good consumer attitude.

As shown in Table 3, the interviewees highlighted three main pillars of sustainable design: experience-based longevity, technological innovation, and transparent supply chains. While embracing sustainability, independent designers face significant challenges, particularly regarding material waste and cost management. Despite these hurdles, many strive to incorporate recycled materials, bio-based resources, and transparent production practices to elevate sustainability and consumer trust.

Table 3.
Sustainable Design Concept and Challenges.

Sustainable Design Concept	Concept 1: Experiences in Design	Respondents generally agreed that extending the life cycle of a product is at the heart of sustainable design. Good design balances aesthetics, comfort and environmental friendliness, and takes longevity as a key indicator, e.g., through classic silhouettes and high-quality fabric choices to ensure that products can be worn for a long period of time without becoming obsolete. At the same time, it is also important to consider whether the product is made for sustainability purposes, and to recycle, reuse and recycle, etc., and to explore more of these inherited materials, rather than using too many sturdy materials that are easily replaceable or damaged. In addition, some interviewees suggested that incorporating traditional culture into design in a way acceptable to contemporary young people can enhance the quality and longevity of the product and realise the spiritual dimension of sustainability. This cultural continuity not only gives a deeper meaning to the design but also broadens the dimension of sustainability from the material level to the long-term continuation of cultural values.
	Concept 2.: Technological Perspective	Technological innovation plays a key role in the sustainable design process of independent designer labels. Through the innovative application of digital design technology, the progressive transformation of intelligent production systems and the integration of material innovation, designers have overcome the waste of resources in traditional production modes to achieve more efficient and environmentally friendly creative realisation. According to the interviewees, 3D printing technology has significantly improved product development. While the traditional hardware process relies on 2D drawings, 3D printing can instantly present three-dimensional finished products, compressing the development cycle from one month to 10-15 days, resulting in a significant increase in development efficiency. Meanwhile, environmentally friendly materials such as polylactic acid (PLA) are also being introduced into the printing line, with its recyclable properties reducing trial and error costs while balancing modelling accuracy and sustainability requirements. Independent designer labels are exploring production methods and material innovations for small-scale production. For example, they are prioritising using vegetable dyes in the printing and dyeing process or working with eco-friendly factories to reduce the high levels of pollution associated with traditional chemical dyes. In terms of material selection, designers prefer to use recyclable resources, such as precious metal scrap that can be remoulded and bio-based materials such as PLA that can be reprocessed to close the loop.
	Concept 3.: Supply Chain Perspective	The interview results show that designers try to care about the environmental attributes of their clothes, such as whether chemicals, pesticides and synthetics are used in the clothes, and then how much carbon dioxide is consumed in the production of clothes for sale, and whether the consumption is lower than the industry standard, and are often concerned about these issues. There is a term called supply chain transparency, where the entire supply chain is shared with the customer, for example, where the fabrics are produced, and even how much they cost is disclosed to the consumer, including the origin of the cotton, the origin of the cotton and linen, whether they are recyclable or not, and whether the different fabric suppliers are qualified for eco-labelling. At the same time, respondents believe that consumers can be made more aware of where these things come from. Transparency at the source of the industrial chain is actually a very big challenge for designers. If the entire factory fabric industry chain can be more transparent, then designers and brands will have more room for choice. Then this will also make it easier for consumers to choose more environmentally friendly clothes, and consumers will be able to participate more actively.
Sustainability challenge	Challenge One: waste	One interviewee stated that in the product development stage, there is a lot of waste in the traditional model, as brands waste a lot of material in the process of making samples and modifying them until they are satisfied. However, if other sustainable technologies, such as 3D printing, are used to reduce the number of sampling times by allowing the pattern to be pre-determined in a 3D model, this can reflect sustainable development. In addition, including recycling or remodelling of some old products, etc., in fact, can go to the brand can go to consider going to the future of an executive mode.' Another interview result show that for designers, the choice of more suitable and more environmentally friendly materials is also a challenge to be faced, if the industrial chain source transparency. Designers in the choice of fabrics, you can

		understand the factory's source information, for example: in the choice of organic cotton, fabrics that use fewer chemicals and pesticides, in this way, the process of producing cotton will be healthier and cleaner.
	Challenge Two: Cost production	The interview results show that while sustainability is considered during the product development stage, it is not always the primary concern for brands. Instead, efficiency and cost are often given higher priority. However, when other factors are equal, designers prefer to use environmentally friendly technologies and materials. One interviewee added that at the start of their brand, they aimed to incorporate biodegradable and recyclable materials as much as possible, striving to maintain sustainability without compromising cost-efficiency.

5. Discussion

5.1. Sustainable Innovation Approaches and Development among Independent Designers and Their Labels

During the design process, designers try to increase the sustainability of their products through several methods and tools [23, 24]. The study shows (Table 2) that designers integrate sustainable design methods with components such as label values, product design, supply chain management, and consumer communication. The component with the highest percentage of mentions was sustainable practices in product design, which aligns with the previously mentioned importance of designers' impact on product sustainability during the design phase. Interviews mentioned that designers integrate with products through material innovation, process optimisation and technological innovation. Independent designers have made extending the life cycle of their products a core principle, emphasising that product aesthetics go hand in hand with comfort and environmental friendliness. They choose environmentally friendly materials that are within the cost range, reduce waste through process optimisation and technological innovation to extend the product's life. In addition, sustainability in the supply chain and production management promotes transparency and low-carbon operations, such as giving preference to factories with environmental certification and simplifying unnecessary steps in the production process. The results of these interviews showed that although independent designer labels have limited resources, through creativity and precision, sustainability can not only be a point of differentiation for labels but also gradually drive changes in the industry.

5.2. Concepts And Challenges of Sustainable Design in the Fashion Design Process

As shown in Table 3, the issues designers encounter during the design process and how sustainable design can be integrated into their designs. The fashion industry often faces multiple challenges in promoting sustainable design, which stem from resource constraints being closely related to the industry ecology, consumer habits, and market environment [25]. Often, independent designer labels are smaller and have relatively limited resources, while facing more difficulties in sustainable practices due to a greater focus on creativity and uniqueness. In a brand's circular business system, the impact of designers on product sustainability during the design phase is notable. Yet, designers' critical role and potential impact in contributing to the circularity of the fashion industry have not been fully researched [26]. There is still a need to explore and improve how the design process can lead to sustainability [27]. It has been shown in several studies that fashion designers not only master the core logic of product development through diverse practices, but also proactively advance the process and development of sustainable design [14, 15, 23, 28]. According to this qualitative study, most of the respondents believe that choosing more suitable and environmentally friendly materials and transparency at the source of the industrial chain is a great challenge for designers, and that if the entire factory fabric industrial chain can be made more transparent, then designers and brands will have more space to choose. And this will make it easier for consumers to choose more environmentally friendly clothes and be more actively involved. In addition, most interviewees also mentioned that finding a balance between sustainable technology and traditional craftsmanship is also a challenge for designers,

and that sustainable technology and craftsmanship should be used as much as possible within the cost limits.

6. Conclusion

In this study, the challenges independent designers face in practicing sustainable design to address them are analysed. It is found that although independent designer labels have limited resources in the product development process, designers can still find a way to thrive in sustainability through strategies such as communicating the brand's sustainable values, technological and material innovation, and industry collaboration. According to the study, the core challenges for independent designer labels focus on three areas: firstly, the limitations of sustainable material choices, as there is an unstable supply of environmentally friendly materials, high costs of some sustainable technologies and materials, and compromised performance; secondly, bottlenecks in the application of technology, as digital tools such as 3D modelling software are costly to learn, and the efficiency of traditional processes is low in comparison; and thirdly, the dilemma of supply chain management, as small brands lack bargaining power and find it challenging to obtain environmentally friendly certifications. Third is the dilemma of supply chain management, where small brands lack bargaining power and have difficulty obtaining complete environmental certification information. In the face of these challenges, designers are exploring innovative solutions, prioritising sustainable technologies, optimising traditional processes to reduce waste, and streamlining unnecessary aspects of the development process to achieve progressive transparency. In terms of materials, they are prioritising the use of eco-friendly materials in the product design process; in terms of technology, they are partially incorporating digital technologies, such as 3D printing, which was mentioned in the interview as a way to achieve rapid product development, thereby reducing the product cycle time by 50%; and in terms of precision and transparency in the supply chain management, with disclosure of information at key points in the product development process. Finally, it is worth noting that these practices are all characterised by the 'values-driven' nature of independent designers - incorporating sustainable concepts into brand narratives and building emotional connections through product stories.

The strength of independent designers lies in their rapid iteration and innovative expression, enabling sustainable concepts to be understood by more people through brands and products, and transforming environmental protection into a design language with aesthetic value. Future research could further explore the differences in sustainable practices among designers of different sizes and the catalytic role of sustainable technologies in the design process. Sustainable design is not only a requirement for environmental protection, but also a strategic choice for independent designers to establish brand differentiation and long-term competitiveness.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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