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Sustainable Strategies for Creating Aesthetically Relevant Fish Leather Products

Meng An*
Art and Design department,International College, Krirk University Bangkok,Thailand,10220.
ORCID iD: https://orcid.org/0009-0003-3941-7030
Email: am666@163.com

The future competitiveness of the fashion industry, particularly within the leather sector, will be significantly influenced by the ability to balance sustainability with luxury, addressing both environmental challenges and ethical sourcing practices. This study aimed to formulate a strategy for designing aesthetically appealing fish leather products underpinned by sustainability principles, with a focus on reducing reliance on animal-based leather and mitigating the associated environmental impacts of agricultural and animal husbandry practices. Key environmental concerns include deforestation for grazing, greenhouse gas emissions, and the water-intensive processes involved in livestock rearing for leather production. A review of the literature on fish leather production provided insights into sustainable innovations within the industry. Building on this knowledge and collaborating with experts from a local fish leather manufacturing facility, the researcher developed two aesthetically appealing fish leather products (handbags) using environmentally friendly techniques such as vegetable tanning and natural dye printing. Testing conducted on these products highlighted that fish leather production rooted in sustainability yields durable, distinctive items with exceptional aesthetic appeal and material quality. These attributes resonate strongly with the increasing segment of environmentally conscious consumers. The findings of this project underscore the potential of sustainable leather alternatives to reduce the environmental impacts traditionally associated with livestock-derived leather.

Keywords: Fish Leather, Sustainability, Vegetable Tanning, Market Potential, Consumer Perception

Introduction

The fish leather industry is among the oldest industries, originating from the ancient traditions of Arctic societies residing along coastal and riverine areas. Prior to the advent of synthetic fibres, evidence indicates that Arctic communities in regions such as Siberia, Alaska, Japan, and Scandinavia utilised fish skin as a primary raw material for leather products, clothing, and accessories (Dreesmann, 2024; Palomino & Defeo, 2022). However, the advent of modernity introduced textiles such as silk and cotton, which gradually displaced fish skin as a preferred material. This shift, coupled with overfishing, increased water pollution, and the transition to farming practices among Arctic Indigenous populations, contributed to the decline of the fish leather industry (Palomino & Defeo, 2022).

Although the craft of fish leather production experienced a significant decline with the emergence of synthetic raw materials and alternatives like cotton and silk, the contemporary fashion industry is increasingly driven by sustainability as a catalyst for innovation (Dreesmann, 2024; Friedrik, 2018; Palomino & Defeo, 2022). Fish leather presents promising potential as a natural material capable of replacing conventional leather in folk arts and crafts. It is recognised for its environmentally friendly characteristics, offering artisans and manufacturers new possibilities for creating products with unique textures and appearances unattainable with traditional animal-derived leather. Moreover, fish skins utilised in fish leather production contribute significantly to reducing costs within the fishing industry while minimising environmental pollution by advancing circular economy practices. As sustainability becomes a central element of consumer consumption patterns, fish leather emerges as a revolutionary material in the fashion industry. Its lower resource usage, distinct attributes, and ability to meet aesthetic and environmental demands position it as a viable alternative that challenges conventional norms in leather production.

Problem Statement

The escalating adverse effects of climate change and global warming observed globally have compelled businesses to transform their operational models by embedding sustainability principles into their processes and products to mitigate environmental impacts (Doppelt, 2017; Hoffman & Change, 2007). Concurrently, consumers are increasingly adopting environmentally conscious attitudes, with many demonstrating a preference for companies and products that prioritise sustainability and ethical practices throughout their production processes and value supply chains (Kumar et al., 2021). In response to these shifts, the fashion industry is anticipated to align with evolving consumer priorities by integrating sustainability into its practices and developing innovative, high-quality products that acknowledge and address the leather industry's environmental impact. This necessitates the adoption of sustainable materials and processes within the leather industry, ensuring minimal ecological and societal repercussions (Moktadir et al., 2020; Omoloso et al., 2020).

Although the leather sector, a critical component of the fashion industry, is expected to adopt sustainable production strategies, evidence indicates that the raw materials and production processes currently in use remain largely unsustainable (see Table 1). Approximately 65% of modern leather is derived from animal sources, while over 20% consists of synthetic alternatives (Varkki, 2024). In contrast to animal and synthetic leather production, fish leather production is recognised as more environmentally friendly, as its raw materials are by-products of the fishing industry. Animal and synthetic leather production contributes significantly to environmental degradation, including pollution, hazardous waste generation, and substantial water and energy consumption (Dreesmann, 2024; Mathew, 2023). The environmental footprint of raising animals for leather includes extensive water usage, greenhouse gas emissions, and land degradation (Dreesmann, 2024). By comparison, fish leather production employs eco-friendly tanning methods, such as vegetable tanning, which avoids the use of harmful chemicals. This contrasts sharply with conventional leather tanning processes for animal leather, where chromium salts are utilised despite their detrimental social and environmental consequences (Dreesmann, 2024; Mathew, 2023).

Table 1: Comparison of the Environmental Footprint of Fish Leather, Animal Leather, and Synthetic Leather.

Environmental Factor	Synthetic Leather Production	Animal Leather Production	Fish Leather Production
Emissions of Greenhouse gases	High, since it is primarily produced from petroleum products	High due to methane produced from animal waste.	Lower as it is based on the byproducts of fishing industry
Sourcing of raw materials	It is sourced from petroleum, which results in high GHG, especially during production	Keeping animals and their waste products has huge impact on the environment due to methane production, huge land usage, and destruction of vegetation	Fish byproducts, hence no additional fishing is needed
Amount of water consumed	The level of water consumption is moderate	High levels	Low water consumption as the processes do not require much water
Toxicity of chemicals used	The production of synthetic polymers results in high levels of toxicity.	High levels of toxicity, especially when conventional tanning methods, including chrome tanning, are used	Low, especially among sustainable-driven companies which use vegetable tanning
Amount of energy consumed	Energy consumed is high	High	Low energy consumption
Amount soil, land, and water pollution	Pollution is high	High because of livestock farming	Low level of water consumption since the processing technique is not water-intensive
Amount of waste released to the environment	High, most of which is non-biodegradable, hence negatively contributing to the environment	High as it includes both animal waste and chemicals used	Low, as it uses fish waste from the fishing industry; the waste is highly biodegradable
Land usage	Low land usage	Requires large tracts of land to rear animals	Low

Note: Author's Compilation Based on Varkki (2024), Mathew (2023), and Dreesmann (2024).

In addition to its environmental benefits, fish leather is stronger and more durable than many animal-derived leather products due to the cross-fibre structure of fish skin. Its unique texture and patterns further enhance its aesthetic appeal, offering a distinctive and attractive alternative (Dreesmann, 2024). Despite these strong sustainability credentials, fish leather production remains underutilised in the leather industry. This limited adoption may stem from a lack of sufficient knowledge regarding sustainable fish leather production techniques in the fashion market or a broader lack of motivation to prioritise sustainability within the industry. This project aims to address these challenges by showcasing how sustainability-driven innovation can facilitate the development of a diverse range of aesthetically appealing fish leather products that offer superior quality and uniqueness.

Objectives

Aligned with the identified gap, this study aims to accomplish the following objectives:

1. To develop a strategy for designing aesthetically appealing fish leather products underpinned by sustainability principles.
2. To evaluate consumer perceptions and reactions to the developed fish leather products to assess their acceptability and aesthetic relevance.

Literature Review

Definition and Explanations on Fish Leather and Sustainability

Sustainability-driven fish leather production remains a relatively underexplored area of research, resulting in its limited application within the leather industry (Maina et al., 2019). Although numerous studies have examined sustainability efforts in leather manufacturing processes, there is a notable lack of research focusing on fish skin as a material. This gap highlights a critical opportunity for further investigation into sustainable fish leather production.

Fish Skin Benefits as Potential Materials for Environmentally Friendly Products

Research on the environmental impact of fish leather production highlights several notable benefits. Utilising fish skin as a raw material effectively recycles fish waste, addressing the global issue of fish production waste, which is estimated to reach 50% of the total fish caught (Arvanitoyannis, 2010). When fish skin is discarded and decomposes in marine environments, it can disrupt oxygen levels and contribute to the spread of diseases. Fish leather production offers a sustainable solution to these challenges, particularly in coastal regions. Additionally, fish leather manufacturing facilities are often located near sources of raw materials, reducing the need for long-distance transportation by rail or road. This proximity significantly lowers greenhouse gas (GHG) emissions associated with transportation, further enhancing the environmental benefits of fish leather production (Palomino & Defeo, 2022).

Sustainability Aspects in Leather Production

The sustainability of fish leather production primarily depends on the tanning and dyeing processes used during production. Bio-tanning has been identified as a viable alternative to the traditional chrome-based tanning process, as highlighted by Duraisamy et al. (2016). This shift towards bio-treatment, which involves using plant or animal tannins as tanning agents, offers a potential solution to the environmental issues associated with synthetic tanning methods. However, prior studies still employed chrome tanning, which poses significant sustainability concerns due to the harmful chemicals involved in the process.

Fish Leather-Types, Characteristics, and Applications

Fish leather, which will be discussed and analysed further, possesses distinct structural and physical characteristics that make it suitable for leather manufacturing, including the production of fish skin bags and shoes. Zengin et al. (2015) and Maina et al. (2019) highlighted that while fish skin is not commonly used, it is hard, thin, and highly durable attributes that are highly desirable for leather goods. Additionally, the unique structure of fish skin enables the creation of products with superior wear resistance and a stylish appearance. As such, fish leather holds significant potential as a sustainable material in the ecology-focused fashion industry.

Problems and Market Take-up

Despite the advantages of fish leather production, its adoption within the fashion industry has been limited. This reluctance can be attributed, in part, to research constraints and the lack of exploration into other aesthetically relevant designs that could enhance market competitiveness (Palomino & Defeo, 2022). This paper identifies that while the acceptability of fish leather products is often determined by their material sustainability, the aesthetic qualities of these materials have rarely been explored in research. Additionally, many previous studies on sustainable fish leather tanning have used chrome tanning methods (Wairimu et al., 2020), suggesting that the current study should focus on employing sustainable tanning and dyeing processes, such as vegetable tanning and natural dyeing.

Research Gap and Future Directions

Although fish leather products are relatively new to the market, there has been limited research that simultaneously considers both the economic and artistic perspectives. Furthermore, few studies have focused on assessing consumer attitudes to enhance the acceptance and demand for sustainably produced fish leather products. This research aims to bridge that gap by adopting environmentally sustainable methods of tanning and dyeing fish skins, resulting in attractive and marketable fish leathers.

Methodology

As previously stated, the objective of this paper was to design a strategy for creating aesthetically relevant fish leather products based on sustainability principles. To achieve this, the researcher explored literature on the use and processing of fish skin, as well as printing methods that contribute to the aesthetic value of such leather products. This preliminary research provided insights into the environmental benefits of fish leather and its potential as an alternative to other types of leather in the fashion industry. The acquired knowledge was further enriched through personal observations and practical experimentation at a local fish leather manufacturer. This collaboration facilitated a deeper understanding of the processes involved in transforming fish skin into leather, the printing techniques employed, and strategies for enhancing the aesthetic appeal and properties of fish leather products. The interaction with the manufacturers provided crucial insights into the acceptance of this alternative leather product within the fashion industry and its overall performance. After developing the first leather product (a bag) and testing it with various digital printing technologies, it was observed that water-based dyes exhibited poor adherence to fish leather (See Figure 1 below). Through multiple printing tests, guided by the expertise of the printing specialists at the fish leather manufacturer, the desired printing properties such as absorption, texture, and appearance were successfully achieved. This process involved carefully balancing pressure and temperature, as well as selecting the appropriate printing technology and techniques. Additionally, the dyes chosen for the process were more environmentally friendly. After successfully creating the desired aesthetic fish leather products, the researcher organised exhibitions to gather feedback from consumers. This provided valuable insights into their perceptions of the products, including aspects such as quality, appearance, uniqueness, cost, and other factors influencing their purchasing intentions in the fashion industry. The findings and feedback collected during these exhibitions are included in this report.

Figure 1: The Water-Based Dyes Resulted in Non-Uniform Penetration.

Process Followed to Develop the Fish Leather Products

The transformation of fish skins into a luxurious material is a complex process that combines modern innovations with traditional techniques to ensure durability and quality while minimizing the environmental impact of production. The steps involved in processing fish leather products are summarised in Table 2 and illustrated in Figure 2.

Table 2: Major Steps Followed in Processing of Fish Skin to Develop Leather Products.

Step	Description
1. Sourcing the Fish Skin	The entire process commences with sourcing the fish skin, a by- product of the fishing industry. The fish skins mostly come from fish processing plants, which are involved in extracting meat and other edible components of fish. The commonly used fish skins come from tilapia, cod, and salmon because of their big size, texture, and strength.
2. Cleaning and Preparation	After collection as waste from the fish processing factory, the fish skins are thoroughly cleaned to remove flesh, scales, and other residues. Cleaning ensures the purity of the material, which ultimately determines the quality of the final product. Once cleaned, the skins are softened by soaking them in a solution in preparation for the tanning process
3. Tanning	Tanning is the main step as it transforms the fish skins into durable leather. Essentially, this step involves treating the skins with tanning agents to prevent them from decomposition and prepare them for further processing. Different turning methods are used, including vegetable tanning (which involves natural plants) and chrome tanning; this project used vegetable tanning (discussed later).
4. Dyeing and Finishing	This step enhances the aesthetic value of fish leather products, as fish leather can be dyed into a wide range of colours and include different printing designs. For sustainability-conscious companies, the dyes used are natural to reduce the ecological footprint of the production process. The finishing process entails adding a protective coating or embossing patterns and other treatments that intend to improve the durability, texture, and appearance of the fish leather.
5. Quality control and Dispatch	This step ensures that each piece meets the industry's quality standards. It also assesses consistency in colour, texture, strength, and defects before dispatching the leather material to manufacturers, designers, and artisans globally.

Note: *Adapted from* Dreesmann (2024).

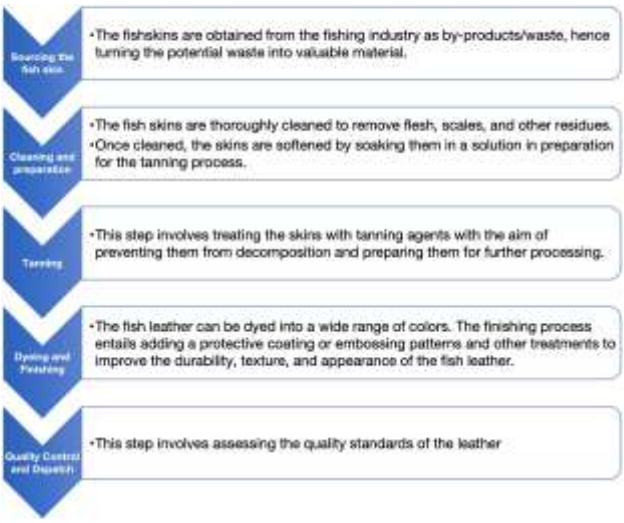

Figure 2: Fish Leather Production Process.

Fish-Leather Tanning Method (Vegetable Tanning)

Tanning is a critical step in determining the quality and other desired properties of leather products. For this project, the vegetable tanning method was employed, which accounts for about 10% of all leather products (Friedrik, 2018). This process uses natural tannins to alter the protein structure in fish skin, turning it into leather. The organic substances used in vegetable tanning not only help preserve and strengthen the leather but also impart color to the hide (Abid et al., 2020). Vegetable tanning typically involves plant materials with high tannin concentrations, such as roots, leaves, and barks, with common tree species including oak, willow, mimosa, birch, and chestnut (Friedrik, 2018). For this project, the tannins were extracted from three plant species: A. Indica, A. Nilotica, and C. Fistula. These tannins were pre-extracted and stored. The process for preparing the fish leather began with the removal of the scales (fleshing), followed by rinsing the fleshed skin in clean water for 15 minutes. Next, the skin was depigmented using a drum containing xylanase enzyme (4%) and water (30%) for 5 hours, then pickled in a solution containing salt (10%) and sulfuric acid (1%). The tanning process followed, during which the fish skins were tanned with the different tannins extracted from the three plant species for one day, after which they were dried.

Results

The strength of the tanned leather was assessed by measuring its thickness using a thickness gauge (SATRA), which is the approved standard (IUP/4 and ISO 2589:2002). Additionally, the tensile strength and percentage of elongation were measured using the material testing machine (Lloyd), in accordance with the quality standards ISO 3376:2011 and IUP/6 (Abid et al., 2020). To evaluate the suitability of the selected plant species for vegetable tanning, the tanning strength of the three-plant species used in this project, as recommended by the local fish leather manufacturer, was assessed. The tanning strengths of these species are summarized in Table 3.

Table 3: Tannin Strength of the Tree Species Used in Vegetable Tanning.

Sr. No	Plants	Tannis (%)	Non-Tannins (%)	Tanning Strength T/NT
1	A. indica	10.76	0.50	21.52
2	A. nilotica	8.7	1.82	4.78
3	C. fistula	10.6	1.4	7.57

The physical properties of the fish leather products treated with the three vegetable tanning agents are summarized in Table 4. Tensile strength refers to the stress required to fracture the leather, while the elongation percentage measures the extent to which the leather can stretch without breaking. Tensile strength is a critical indicator of quality. In this study, the fish leather tanned with A. Nilotica exhibited the highest tensile strength, elongation percentage, and thickness. Tear strength, another essential property, indicates the amount of force required to make a cut in the leather sample in a specific direction.

Table 4: Properties of Vegetable Tanning Agents Used.

Vegetable Tanning Agents	Thickness (mm)	Tensile Strength (N/mm)	Elongation (%)	Tear Strength (N/mm)
A. Nilotica	0.9	21.32	33	62
A. Indica	0.8	14.33	30	70
C. Fistula	0.6	10.23	18	58

Besides beauty, a good fish leather product (such as shoes) must provide flexibility to prevent cracking and tearing. Therefore, tear strength is crucial as it indicates the product's resistance to damage. In this study, fish leather tanned with A. Indica bark showed the highest tear strength. As shown in Table 4 and Figure 3, fish leather tanned with both A. Indica and A. Nilotica performed well in stress tests, making them suitable for fish leather products intended for various applications. Based on these results, the final sample fish leather products developed in this project, which were presented to consumers, were tanned using vegetable tanning agents from these two tree species.

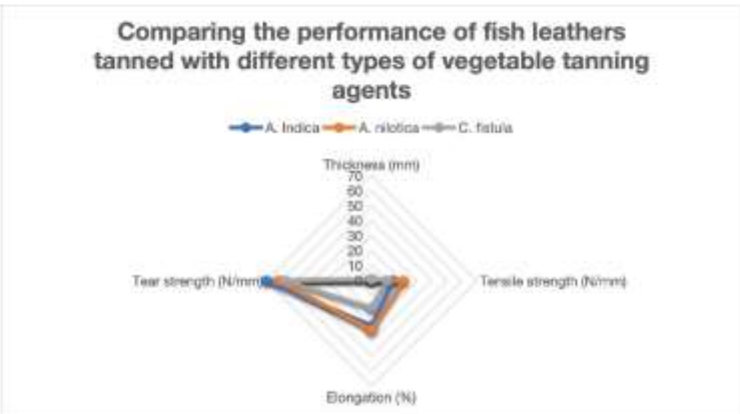

Figure 3: Comparison of the Properties of Fish Leather Tanned with the Three Vegetable Tanning Agents.

Dyeing and Finishing

The aesthetic appeal of the fish leather product relies on dyeing and finishing techniques. In this project, environmentally friendly natural dyes from plants like onions, black turtle beans, pomegranates, and chestnuts were used to enhance sustainability. The researcher collaborated with an industrial chemist experienced in colour measurement and dye kinetics to develop the dyes. Various tests were conducted to assess their suitability, stability, and durability for dyeing and printing the leather. The rheological and physical properties of the dyes were assessed to determine their suitability and stability. The prints were tested for colour fastness and consistency after fixation using the IULTCS/IUF 442 (ISO 15701:2015) standards, which also evaluated potential colour migration into plastic materials by placing the leather in contact with neighbouring materials. As shown in Figure 4, the fastness properties were excellent, with a rating of 4.5 out of 5. The leather product was also tested for colour fading or migration into various textiles under artificial acidic perspiration, following ISO 11641:2012 standards for leather. Different textile fibres, including wool, cotton, acrylic, polyester, and acetate, were used for testing. The dyed leather performed well in most cases, with only a light stain observed on the acetate fibre. The test results are shown in Figure 5.

Figure 4: Fastening (Colour Migration Test Results).

Figure 5: Colour Fastness/Fading Test Results.

The fading of the leather due to exposure to natural sunlight was tested using the Xenon arc fading lamp (ISO 105-B02:2013). The colour fading of the dyed fish leather was rated on a scale of 1 to 8 against a blue fabric. The results (see Figure 6) showed excellent light fastness, with a score greater than 6.

Figure 6: Colour Fading Test Results.

Testing the Products on Consumers

Two samples created in this project were presented to potential consumers to assess their perceptions and acceptance. The samples, shown in Figure 7, were displayed in an open shop alongside other leather products. Consumers who showed interest were asked for their views and perceptions and invited to fill out a questionnaire about purchasing fish leather products. The results are presented in Table 5. Within six hours, approximately 20 shoppers were attracted to the samples, either by touching, approaching, or inquiring about the price.

Figure 7: Final Samples Tested on Consumers.

Table 5: The Consumers' Views on the Samples Developed.

Question	Responses			N=20			%
What Aspects of the Product Caught Your Attention	Appearance/Design Appeal/Aesthetic Appeal			17			85%
	Uniqueness/Craftsmanship			15			75%
	Quality of Material			14			70%
	Texture/Colour			12			60%
Do the Ethical and Sustainable Practices of Manufacturers Influence Your Decision to Purchase a Leather Product?	Yes			19			95%
	No			1			5%
On a Scale of 1-5, Where 1= Very Bad, 5= Very Good, Rate these Products	Rating Scale	1 (Very Bad)	2 (Bad)	3 (Average)	4 (Good)	5 (Very Good)	
	(1) Design Appeal	0	0	2	14	4	
on the Following Parameters	(2) Craftmanship		3	5	10	2	
	(3) Material Quality			3	16	1	

As shown in the Table 5, the samples performed excellently across various parameters, highlighting the success of this project in developing aesthetically relevant fish leather products. Over 60% of respondents appreciated aspects such as appearance, texture, quality, and craftsmanship. Notably, more than 90% of respondents indicated that the sustainability and ethical practices of leather manufacturers significantly influenced their purchasing decisions, reflecting their awareness of the environmental impact of the leather industry. As shown in Figure 8, the majority of the aesthetic properties of the samples scored above average. Specifically, design appeal and material were rated as "Good" by nearly three-quarters of the respondents surveyed.

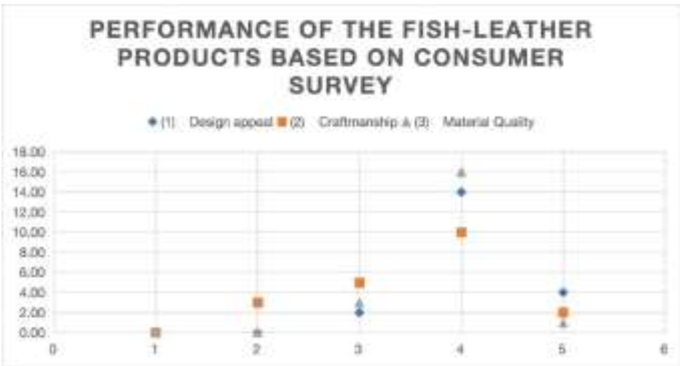

Figure 8: The Performance of the Fish Leather Products Based on Consumer Survey.

Discussion

As demonstrated in the results section, this project successfully developed aesthetically relevant fish leather products that incorporated various sustainability aspects. The two products utilised vegetable tanning methods and natural dyes, reducing their environmental impact. This approach is supported by literature Baquero et al. (2021), Dreesmann (2024), Friedrik (2018), Jakobsen (2016), and Sundar and Muralidharan (2017), which highlights that although vegetable tanning is time-consuming, it is eco-friendly and produces higher-quality leather products compared to chrome-based tanning. Vegetable-tanned leather is durable, free of toxic chemicals, moisture-absorbent, and forms a patina that signifies aesthetic beauty and quality in the leather industry, adding value to the products (Friedrik, 2018). Its biodegradability, natural feel, and smell make it unique and valuable in the market, important factors in the fashion industry. Studies also show that vegetable-tanned fish leather offers greater strength and durability than other textiles, enhancing its value (Dreesmann, 2024). Despite being thinner than animal-based leathers, the vegetable-tanned fish leather products demonstrated higher tensile and tear strength, surpassing standard leather in durability. The decision to avoid chrome-based tanning in this project was guided by various studies (Baquero et al., 2021; Friedrik, 2018; Jakobsen, 2016; Sundar & Muralidharan, 2017), which highlight the higher environmental impact of this method compared to vegetable tanning.

Despite chrome tanning accounting for 80% of global leather production (Jakobsen, 2016), it poses significant ecological risks due to the presence of carcinogenic and toxic substances like chromium and lead, which can harm aquatic life and ecosystems (Friedrik, 2018). Chrome-tanned leather tends to be thinner, softer, less durable, and more prone to cracking, while also being less porous. Furthermore, it has an unpleasant smell and requires excessive water, making it unsustainable (Dreesmann, 2024; Friedrik, 2018; Sundar & Muralidharan, 2017). Figure 9 illustrates the differences between vegetable-tanned and chrome-tanned leather. The environmental performance of the vegetable-tanned leather was further improved by using natural dyes, which also enhanced its aesthetic appeal. Fading and colour fastness tests showed that the dyes met industry standards. Palomino and Defeo (2022) highlighted that plant-derived natural dyes possess the necessary rheological and physical properties to enhance leather aesthetics. Similarly, Hasanah and Islam (2024) noted that natural dyes are gaining popularity due to their eco-friendliness, abundance, cost-effectiveness, and lower environmental and health risks compared to synthetic dyes.

Figure 9: The Appearance of Vegetable and Chrome-Tanned Leather Galen Leather (2022).

Conclusion

Increased awareness of climate change and global warming has led to a shift in the fashion industry towards more sustainable practices. Fish skins, a by-product of the fishing industry, offer an eco-friendly alternative to animal and synthetic leathers. When processed locally, fish leather reduces the ecological footprint, and techniques such as vegetable tanning further enhance its sustainability by using minimal energy and water and avoiding toxic chemicals. The use of renewable energy in production can also lower CO^2 emissions. This study demonstrated that fish leather meets ISO quality standards and, according to consumer surveys, outperforms traditional leather in appearance and material performance. This project thus establishes fish leather as a viable, sustainable alternative in the leather industry.

Recommendations, Limitations and Future Research

This study provides valuable insights into sustainable leather production, highlighting how innovation in fish leather contributes to enhancing the sustainability of the clothing industry. Considering these findings, consumer interest in both luxury and the sustainability of such products remains strong, prompting a call for leather manufacturers to adapt their business strategies accordingly. The production of fish leather, incorporating green tanning, dyeing, and printing techniques, presents an opportunity to reduce both social and environmental impacts while improving product quality and gaining a competitive edge. However, this study is subject to several limitations. Only one type of fish leather product a handbag was examined, and the research focused exclusively on vegetable tanning and natural dyes. Future studies could broaden the scope by exploring a wider range of tanning and dyeing processes, including both conventional and environmentally friendly methods, while comparing aesthetic and sustainability parameters. Additionally, expanding the variety of fish leather products beyond belts, wallets, and shoes, and testing the appeal of Lower 48 fish leathers with a broader consumer sample would contribute to filling this knowledge gap. Future research should also investigate emerging trends such as the individualisation and popularisation of consumption in fashion, examining shifts within the industry and reinforcing the unique selling propositions of fish leather products.

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