

Exploring the Concept of Fashion Waste: Hanging by a Thread

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Abstract—The goal of this transformative endeavour lies in the repurposing of textile scraps, heralding a renaissance in the creation of wearable art. Through a judicious fusion of Life Cycle Assessment (LCA) methodologies and cutting-edge techniques, this research embarks upon a voyage of exploration, unravelling the intricate tapestry of environmental implications woven into the fabric of textile waste. Delving deep into the annals of empirical evidence and scholarly discourse, the study not only elucidates the urgent imperative for waste reduction strategies but also unveils the transformative potential inherent in embracing circular economy principles within the hallowed halls of fashion. As the research unfurls its sails, guided by the compass of sustainability, it traverses uncharted territories, charting a course toward a more enlightened and responsible fashion ecosystem. The canvas upon which this journey unfolds is richly adorned with insights gleaned from the crucible of experimentation, laying bare the myriad pathways toward waste minimisation and resource optimisation. From the adoption of recycling strategies to the cultivation of eco-friendly production techniques, the research endeavours to sculpt a blueprint for a more sustainable future, one stitch at a time. In this unfolding narrative, the role of wearable art emerges as a potent catalyst for change, transcending the boundaries of conventional fashion to embrace a more holistic ethos of sustainability. Through the alchemy of creativity and craftsmanship, discarded textile scraps are imbued with new life, morphing into exquisite creations that serve as both a testament to human ingenuity and a rallying cry for environmental preservation. Each thread, each stitch, becomes a silent harbinger of change, weaving together a tapestry of hope in a world besieged by ecological uncertainty. As the research journey culminates, its echoes resonate far beyond the confines of academia, reverberating through the corridors of industry and beyond. In its wake, it leaves a legacy of empowerment and enlightenment, inspiring a generation of designers, entrepreneurs, and consumers to embrace a more sustainable vision of fashion. For in the intricate interplay of threads and textiles lies the promise of a brighter, more resilient future, where beauty coexists harmoniously with responsibility and where fashion becomes not merely an expression of style but a celebration of sustainability.

Keywords—Fabric-manipulation, sustainability, textiles, waste, wearable-art.

I. INTRODUCTION

THE fashion industry, often lauded for its dynamism and unparalleled creativity, finds itself at a critical crossroads, grappling with the spectre of environmental degradation and the looming shadow of resource depletion. While its kaleidoscopic array of designs and trends captivates the imagination, beneath the surface lies a stark reality characterised by the staggering proliferation of textile waste. Year after year, an astronomical 40 million tons of textile

waste inundate our planet, perpetuating a cycle of environmental harm and ecological imbalance [1]. This deluge of waste, a mere fraction of which finds redemption through recycling efforts, underscores the urgent imperative for a paradigm shift within the fashion ecosystem [2].

Indeed, the sheer magnitude of textile waste bespeaks a systemic malaise, one rooted not only in overconsumption and overproduction but also in the labyrinthine processes that underpin garment creation. From the cutting room floor to the runway, an abundance of unused scraps languish in obscurity, their potential squandered amidst the frenetic pace of production. Yet, amidst this sea of discarded materials, a beacon of hope emerges in the form of innovative approaches to textile waste management, spearheaded by a cadre of visionary designers and researchers.

At the vanguard of this sustainability revolution lies the artistry of repurposing, where discarded materials are imbued with new life and meaning, transcending their erstwhile fate as mere remnants of consumption. One such embodiment of this ethos is the creation of wearable art pieces, where discarded textiles find redemption as elegant and meaningful creations. Central to this narrative is the enigmatic masterpiece known as "Hanging by a Thread," a testament to the transformative potential inherent in repurposing textile waste within the fashion industry.

As the fashion landscape undergoes a metamorphosis, propelled by a collective ethos of environmental stewardship and innovation, "Hanging by a Thread" stands as a poignant reminder of the power of creativity to effect change. Through its intricate interplay of form and function, it serves as a harbinger of a more sustainable future, where waste becomes a canvas for artistic expression, rather than a burden on our planet's fragile ecosystem.

In the crucible of experimentation and exploration, designers and researchers alike are pioneering novel methodologies and techniques aimed at minimising environmental impacts while fostering creativity and innovation. From up cycling to circular design principles, a myriad of approaches are being explored, each offering a glimmer of hope in an otherwise uncertain landscape. Yet, amidst this chorus of change, "Hanging by a Thread" stands as a testament to the enduring power of art to inspire, to provoke, and to catalyse meaningful transformation within the fashion industry and beyond.

II. LITERATURE REVIEW

Applying the lens of Life Cycle Assessment (LCA) theory to the exploration of textile waste and sustainability in the

fashion industry provides a comprehensive framework for understanding the environmental impacts associated with various stages of the product lifecycle. Studies such as those by Tan and Wong [3] and Patel and Gupta [4] contribute to this understanding by assessing the environmental footprints of textile waste generation, management, and recycling strategies. Through LCA, researchers can quantify factors such as energy consumption, water usage, and greenhouse gas emissions, shedding light on the holistic environmental implications of textile waste. Additionally, innovative approaches to textile waste management, such as those examined by Garcia and Chen [5] and Kim and Park [6], can be evaluated within the context of LCA to determine their efficacy in reducing environmental burdens throughout the product lifecycle [5], [6]. Furthermore, the concept of circular economy, as explored by Lee and Wang [2] and Chen and Li [7], aligns closely with the principles of LCA by emphasising resource efficiency and waste reduction strategies. By integrating LCA theory into the analysis of textile waste in the fashion industry, researchers can gain valuable insights into the sustainability performance of various practices and technologies, ultimately guiding the development of more environmentally responsible approaches to textile production and consumption.

This textile implementation is innovative, and though the materials have been around, this application of the materials is new to today's time. Coperni's spray-on dress, which went viral, inspired the implementation of these materials together. These materials were not new to the fashion industry, but the implementation of them together was new. Scraps of fabric and water-soluble embroidery material are not new materials, but the combination of them together is innovative.

The environmental implications of textile waste in the fashion industry have been extensively documented in scholarly literature. Studies such as those by Tan and Wong [3] and Patel and Gupta [4] utilise LCA to assess the environmental footprints of textile waste generation, management, and recycling strategies. Through LCA, researchers can quantify factors such as energy consumption, water usage, and greenhouse gas emissions, providing valuable insights into the holistic environmental impacts of textile waste.

Additionally, innovative approaches to textile waste management, such as those examined by Garcia and Chen (2022) and Kim and Park (2023), can be evaluated within the context of LCA to determine their efficacy in reducing environmental burdens throughout the product lifecycle [5], [6]. These studies highlight the importance of integrating sustainability principles into all stages of the fashion supply chain, from design and production to consumption and disposal.

Furthermore, the concept of circular economy, as explored by Lee and Wang [2] and Chen and Li [7], aligns closely with the principles of LCA by emphasising resource efficiency and waste reduction strategies [2], [7]. By adopting circular economy principles, fashion brands can minimise waste

generation, maximise resource utilisation, and create a more sustainable and resilient industry.

III. METHODOLOGY

The methodology underpinning this research embarks upon a comprehensive odyssey into the intricate nuances of the "threads on fabric" technique, a cornerstone of the awe-inspiring wearable art piece known as "Hanging by a Thread." With meticulous precision and unwavering dedication, the research team embarked upon an exhaustive journey of experimentation and analysis, unravelling the technical intricacies of the technique and delineating optimal parameters for achieving sublime outcomes.

At the heart of this methodological pilgrimage lies a series of painstaking tests and trials, each meticulously designed to decipher the arcane secrets of textile manipulation. Central to this endeavour was the quest to ascertain the ideal dimensions of textile scraps, stitch lengths, and patterns, recognising their pivotal roles in sculpting a malleable textile canvas of unparalleled beauty and resilience.

To initiate the experimentation process, various textile scraps of differing sizes and compositions were meticulously collected and catalogued. Scraps ranged from remnants of cotton and linen to more intricate fabrics like silk and polyester blends. Each fabric type posed unique challenges and opportunities for manipulation, necessitating a comprehensive understanding of their individual properties and behaviours.

Once the raw materials were assembled, the experimentation phase commenced with the exploration of stitch lengths and patterns. Different sewing techniques, ranging from traditional straight stitches to more complex embroidery styles, were employed to affix the textile scraps onto a base fabric. Through iterative testing and observation, it became evident that shorter stitch lengths facilitated tighter integration of scraps, resulting in a more cohesive and durable textile.

Furthermore, the selection of patterns played a pivotal role in optimising material utilisation and aesthetic appeal. Cross-hatching emerged as a particularly effective technique, allowing for the seamless interweaving of scraps while maximising coverage and structural integrity. Each stitch served as a building block in the creation of a unified textile, transforming disparate fabric remnants into a harmonious tapestry of sustainable artistry.

In addition to stitch lengths and patterns, the sizing and placement of textile scraps were carefully considered to maximise material efficiency and minimise waste. Quarter-sized scraps were found to strike the ideal balance between coverage and manoeuvrability, allowing for precise manipulation while minimising excess material. Strategic placement of scraps along predetermined pathways facilitated fluid integration into the base fabric, ensuring uniformity and consistency throughout the textile.

As the experimentation phase progressed, attention turned to the structural reinforcement of the textile to enhance its durability and longevity. Stabilisation stitches were delicately

applied to the edges of each pattern piece, serving as a safeguard against fraying and unravelling. This meticulous process not only bolstered the garment's structural integrity but also imbued it with a sense of permanence and craftsmanship.

Moreover, innovative techniques such as water-soluble embroidery material were explored to further augment the textile's aesthetic appeal and functional properties. By incorporating dissolvable elements into the fabrication process, intricate patterns and textures could be seamlessly integrated into the textile, adding depth and dimensionality to the final garment.

In summation, the methodology employed in this research stands as a testament to the indomitable spirit of inquiry and innovation. Through its meticulous attention to detail and unwavering commitment to excellence, it lays the foundation for a new era of sustainable fashion, where creativity and conservation converge to forge a brighter, more beautiful tomorrow.

IV. RESULTS & FINDINGS

The results of this research demonstrate the transformative potential of repurposing textile waste in the fashion industry. By employing the "threads on fabric" technique, designers can create unique and visually striking textiles from discarded materials, reducing the environmental impact of textile waste. The experimentation conducted in this study has provided valuable insights into the technical intricacies of the technique, including optimal parameters for scrap size, stitch length, and pattern design.

The aesthetic aim of the piece was to transform what might otherwise be perceived as mundane or disposable into something elegant, aligning with the overarching theme of "trash to treasure." The creator sought to elevate materials typically deemed as "useless" or "trash" and breathe new life into them through artistic reinterpretation. Intentional perforations were incorporated into the garment to highlight the unique technique employed in its creation.

Crafting the entire piece required a substantial investment of time, with over 30 hours dedicated solely to sewing. This experimental textile represented a novel exploration, aimed at showcasing the versatility and potential outcomes achievable through the technique. To reinforce the structure of the newly formed textile during the sewing process, 50 yards of water-soluble material commonly used in embroidery were utilised. Following the completion of sewing, the garment was placed on a covered dress form, and a cold water hose was employed to reveal the innovative textile. As the dissolved material dried within the threads and fabric manipulation, it further enhanced the textile's structural integrity.

The aspiration behind this endeavour was to introduce innovation and excitement into the fashion industry. Observing the challenges faced by peers in managing surplus textiles, the creator was inspired to delve deeper into the "thread on fabric" technique, aiming to unlock its full potential and showcase its capabilities. In order to create this piece, extensive research into this technique was done. Various tests

were performed in order to create a clear understanding of this technique and its limitations. Such as the amount of fabric being used in-between the water soluble material. Testing different sized scraps, stitch lengths, and patterns, it was deemed that quarter sized scraps with a small stitch-length is ideal to create a mouldable textile. Through the experimentation, it was found out that if pieces were too big or not uniform enough, they would not spread evenly in between the water-soluble material. Creating a cross-hatching pattern with the thread was the quickest and most effective way to cover the entirety of the garment. Luckily, the water-soluble material stiffens the textile once it is dried, thus, the pattern pieces could be cut out after the textile was created. After the Textile was created, a stitch was used on the edge of each pattern piece to stabilise the textile [3].

Furthermore, the creation of wearable art pieces such as "Hanging by a Thread" serves as a tangible example of waste minimisation and circular economy principles in action. By elevating discarded materials into elegant and meaningful creations, designers can challenge conventional notions of disposable fashion and promote a more sustainable and responsible industry.

In light of these significant findings, a horizon of exciting research opportunities emerges, inviting scholars and practitioners alike to dive deeper into the realm of sustainable fashion innovation. One promising avenue for exploration lies in refining and optimising existing techniques like the "threads on fabric" method to amplify its effectiveness and relevance within the fashion sphere. By fine-tuning elements such as scrap size, stitch length, and pattern design, researchers can unearth new realms of creative potential, unlocking previously unexplored avenues for repurposing textile waste.

Furthermore, the advent of cutting-edge technologies offers a wealth of possibilities for innovation in sustainable fashion. From advanced recycling processes to pioneering materials and manufacturing methods, the field is ripe for transformative breakthroughs. By harnessing the capabilities of artificial intelligence, additive manufacturing, and biofabrication, research can push the boundaries of creativity and sustainability, charting a course towards a more resilient and regenerative fashion industry.

As we stand at the threshold of a new era in fashion, propelled by the twin engines of innovation and sustainability, the opportunities are boundless. By embracing the challenges of textile waste management with passion and determination, we can steer the fashion industry towards becoming a beacon of environmental stewardship and social responsibility. Together, we can embark on this journey of exploration, shaping a future where fashion not only captivates the senses but also nurtures our planet and communities.

V. FIGURES



Fig. 1 "Hanging by a Thread" Model Front View



Fig. 2 "Hanging by a Thread" Mannequin Side View



Fig. 3 "Hanging by a Thread" Mannequin Back View



Fig. 4 "Hanging by a Thread" Textile Close up

VI. CONCLUSION

In conclusion, the findings of this research underscore the critical significance of sustainable textile waste management within the fashion industry. Through the adoption of innovative methodologies like the "threads on fabric" technique and the integration of circular economy principles into design practices, designers wield a powerful arsenal in the battle against waste proliferation. By repurposing discarded materials and embracing a mindset of resource efficiency, fashion creators not only minimise environmental harm but also pave the way for a more conscientious and sustainable future.

Looking ahead, it is imperative for stakeholders across the fashion spectrum to redouble their efforts in exploring novel avenues for textile waste management. Designers, researchers, and industry leaders must collaborate in a concerted effort to drive innovation and sustainability throughout the fashion supply chain. This entails not only the development of cutting-edge techniques and materials but also the cultivation of a culture of environmental consciousness and responsibility.

Moreover, the imperative for sustainability extends beyond mere lip service—it must be woven into the very fabric of the fashion industry's ethos. From sustainable sourcing practices to ethical production methods, every aspect of the fashion ecosystem must be imbued with a commitment to environmental stewardship. Only by embracing this holistic approach can the fashion industry truly evolve into a resilient and environmentally responsible enterprise—one that not only meets the needs of present generations but also safeguards the legacy of our planet for future ones. Thus, let us forge ahead with determination and vision, charting a course towards a fashion landscape that thrives in harmony with nature and humanity alike.

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