

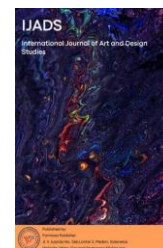


INTERNATIONAL JOURNAL OF ART AND DESIGN STUDIES (IJADS)

Homepage: <https://journal.formosapublisher.org/index.php/ijads/index>

ISSN: 2961-8088 (Online)

Research Article



Volume 2, No	DOI:	Page:
3, August	https://doi.org/10.55927/ijads.v2i3.8882	207–
(2023)		216

Conceptual Framework Construction and Application for Upcycling Fashion Using Plastic Waste

Monica Elias¹, Chunsheng Wu²

Zhejiang University of Science and Technology, China

Corresponding Author: Monica Elias monellia07@gmail.com

ARTICLE INFO

Keywords: Plastic waste,
Upcycling, Conceptual
design, Sustainable fashion

Received : 17, June

Revised : 18, July

Accepted : 19, August

©2023Elias, Wu : This is an
open-access article
distributed under the terms of
the [Creative Commons](https://creativecommons.org/licenses/by/4.0/)
[Atribusi 4.0 Internasional](https://creativecommons.org/licenses/by/4.0/).



ABSTRACT

This study aims to develop an innovative framework and method for upcycling fashion design using plastic waste, integrating relevant concepts and design theories. Through a literature review of conceptual design and creative skills theories, collaboration with XSPProject and HeySTARTIC in innovative design practices, and practical verification methods, we introduced the 'Conceptual Design for Upcycling Fashion'. This framework effectively guided the design process of creating an upcycled fashion collection comprising five bags. During the prototyping phase, we repurposed 208 medium-sized plastic bags, challenging traditional practices and transforming waste into innovative designs. The findings of this study provide fashion practitioners with a valuable resource for developing successful upcycled fashion collections by utilizing the 'Conceptual Design for Upcycling Fashion' as a guiding framework within the design process.

INTRODUCTION

Ecological civilization and sustainable development have increasingly become priorities for governments worldwide. Effectively managing daily and production waste poses a significant challenge for people, with plastic waste being a prominent issue. While there are many benefits to using plastic, the way plastic waste is disposed of is unsustainable. It is predicted that by 2050, the ratio of plastic to fish in the ocean will reach 50:50. The

generation of plastic waste has increased dramatically, with 79% ending up in landfills (UNEP, 2018). According to Geyer's prediction, there will be 12 billion tons of plastic waste by 2050 (Geyer et al., 2017). Faced with these problems, experts and scholars have proposed many sustainable design concepts and methods, including "upcycling". Upcycling discarded plastic bags presents an opportunity to mitigate the issue. Moreover, upcycling aligns with design principles to enhance

product value without depleting resources.

In their 2002 book "Cradle to Cradle: Remaking the Way We Make Things," William McDonough and Michael Braungart introduced the concept of upcycling. Its aim is to avoid discarding high-quality materials by revaluing them for reuse instead of disposal (Obara Kai et al., 2022). Upcycling is essentially the process of turning disposable items into something more valuable (Wegener, 2016). In fashion terms, it focuses on repurposing "end-of-life" garments or creating new pieces from existing materials (Koch, 2021).

Globally, upcycling is gaining popularity, particularly in fashion and textiles. However, researchers have not paid attention to areas such as housewares, furniture, jewelry, and accessories (Sung, 2015; Sung, 2017). In Indonesia, upcycling gained momentum in 2016, primarily focusing on fashion and textiles from textile waste. A study by Sung reviewed 52 literature sources from 2011 to 2022, revealing extensive exploration of plastic upcycling through recycling processes, while fashion and textile upcycling often involves redesigning second-hand clothing (Sung, 2023).

To effectively address the plastic waste issue through upcycling fashion design, it's crucial to employ a structured design process. This involves a clear, step-by-step conceptual design approach, aiding designers in tackling the problem and devising a focused solution. Systematic design techniques, known for their repeatability, logic, and scientific basis, are favored over traditional methods. By adopting the conceptual design process

framework, it enables fashion practitioners to grasp the flow of each stage in the conceptual design process, leading to more successful designs through a conceptual, experimental, and process-driven approach.

The research highlights a significant gap in the field of upcycling, particularly in fashion design, where structured design processes are crucial for addressing plastic waste effectively. Despite acknowledging the importance of such processes, there is a notable lack of research dedicated to developing and implementing tailored design frameworks for upcycling initiatives. Additionally, while systematic design techniques are preferred over traditional methods in upcycling fashion design, there is a distinct lack of a clearly defined conceptual design process framework specifically tailored for upcycling initiatives. Therefore, it is imperative for research efforts to address these gaps by developing structured frameworks that guide designers through each stage of the conceptual design process for upcycling. This approach will facilitate the creation of more effective and targeted solutions in tackling plastic waste challenges.

Framework Construction for Upcycling Fashion Conceptual Design

The design process is designers' response to changing problem structures, especially in a competitive market and collaborative work environments where fashion product development is increasingly complex. Understanding and adapting design processes are crucial skills for

designers (Au & Au, 2018). The conceptual design phase establishes the foundation for the entire process, guiding subsequent stages and shaping the final outcome. Thus, conceptual design is essential to ensure that the end product meets its goals, functions effectively, and resonates with its audience. The term "Conceptual Design" originated in the 1980s from American graphic designer Ellen Hobart Allen Hubert's book, emphasizing visual planning of ideas before delving into specifics.

Au's research introduced a four-phase conceptual design model for fashion (Au, 2018). It comprises of:

1. Investigation: designers identify the core concept and create a scenario aligning with direction, goals, and inspiration. They analyze collected information to choose a key concept.
2. Interaction: designers develop their concepts in line with the established scenario, using tools like collages and verbal storytelling to harmonize ideas.
3. Development: focuses on turning conceptual ideas into design sketches, ensuring alignment with practical outputs and confirming feasibility.
4. Evaluation: addresses the conceptual aspects and context of the design output, allowing for adjustments based on features, meanings, aesthetics, and suitability, with prototypes for further refinement.

Although Au's conceptual model effectively guides the design process, it's tailored for high fashion collections and may not fully suit upcycling fashion. Conventional design usually

begins with market trend research, followed by ideation, material selection, prototyping, and refinement. In contrast, upcycling design starts with material collection, followed by ideation, prototyping, and refinement. Due to these distinctions, an adjustment of Au's model is necessary for upcycling fashion based on its own needs and characteristics. Hence, this study introduces a Conceptual Design for Upcycling Fashion (Figure 1).

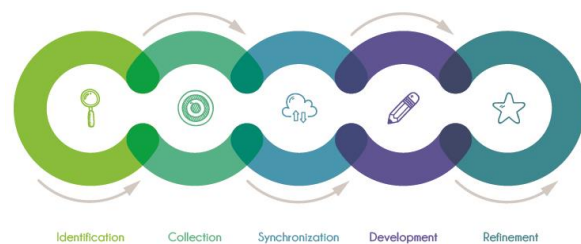


Figure 1: Conceptual Design for Upcycling Fashion framework

The proposed framework includes the following stages:

1. Identification: the initial step involves identifying the problem, encompassing environmental, industrial, social, cultural, economic, technological, or behavioral issues.
2. Collection: unlike conventional design processes, upcycling begins with collecting waste materials for design development.
3. Synchronization: designers gather information and inspiration from various sources, synchronizing distinctive ideas into tangible forms like collages and mood boards.
4. Development: ideas generated in the previous stage are developed into design sketches and prototypes.
5. Refinement: the final stage involves polishing the initial

design to enhance both details and the overall product.

Creative Skills

In the third stage of the proposed upcycling design framework, called Synchronization, designers convert ideas and information into tangible forms. Creativity skills are essential at this stage, as "conceptual" fashion requires "inner qualities" such as creativity (Reiter-Palmon & Murugavel, 2020). Creativity is a highly complex context, designers are always challenged by limitless and complicated thoughts during their creative process. Therefore, to help designers utilize creativity effectively and make it less complicated, creativity needs to be integrated into the conceptual design framework.

Geneptore, proposed by Finke, is a creativity model consisting of two phases: generative (divergent) and exploratory (convergent). It emphasizes generating innovative ideas and refining them through exploration. In the generative phase, individuals employ divergent thinking to generate multiple uncensored ideas, while the exploratory phase involves refining and narrowing down these ideas through convergent thinking (Brouwer, 2020). Preinventive structures include new patterns, forms, blends, exemplars, models, and combinations. In conceptual design, these structures develop into knowledge entities through exploration. Divergent thinking, crucial in fashion design, enables designers to explore various solutions to complex problems, promoting originality and creativity (Au & Au, 2018). Convergent thinking, in contrast, often produces traditional solutions. Research has

demonstrated its importance in creative problem-solving (Wigert et al, 2022). Alongside divergent thinking, convergent thinking is crucial in the creative process, assessing and choosing ideas for execution (Blair & Mumford, 2007). Both types of thinking contribute to problem construction (Reiter-Palmon & Murugavel, 2020), with convergent thinking facilitating analytical and evaluative skills (Glăveanu & Tanggaard, 2014).

Fashion Design and Development (FDD) creativity can be divided into two types: Leadership Creativity and Adaptive Creativity. Leadership Creativity prioritizes innovation and significant investment in research and development, often leading to higher-priced products. Conversely, Adaptive Creativity relies on established trends and analytical approaches to develop products within set boundaries (Ruppert-Stroescu & Hawley, 2014). This study aims to develop designs that tackle plastic waste with an innovative approach similar to Leadership Creativity, while also preserving affordability and trendiness, characteristic of Adaptive Creativity. Thus, it suggests a balanced creativity, termed Innovative Creativity, combining both aspects (Figure 2), which will incorporate Geneptore as its systematic approach. When integrated with the Conceptual Design for Upcycling Fashion, the Innovative Creativity model facilitates ideation during the Synchronize phase (Figure 3).

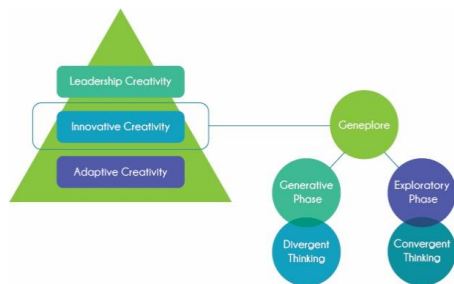


Figure 2: Innovative Creativity

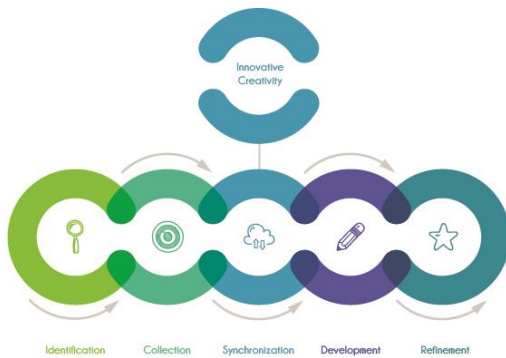


Figure 3: Innovative Creativity in Conceptual Design for Upcycling Fashion

METHODS

Application of ‘Conceptual Design for Upcycling Fashion’ Framework

To investigate the applicability of the constructed conceptual design for upcycling fashion framework in real-world projects, this study employs a practical verification method. The framework, consisting of five stages—identification, collection, synchronization, development, and refinement—serves as the foundation for this examination.

1. Identification: The study primarily addresses the significant issue of plastic waste in Indonesia, particularly single-use LDPE plastic bags. These bags present recycling challenges due to labeling, weight, and cleaning concerns, contributing to environmental harm such as waterway clogs, ocean pollution, and wildlife endangerment.

2. Collection: Utilizing a collaboration with XSPProject, an Indonesian organization, the study sources single-use plastic bag waste. Due to logistical constraints, prototyping takes place in China using locally available plastic bags. XSPProject partners with local trash pickers to gather non-biodegradable plastic waste, which subsequently undergoes sorting, washing, and drying processes to ensure quality. The collected plastic bags predominantly consist of black, white, and red varieties.

3. Synchronization: Information and inspiration are gathered from various sources to narrow down the target consumer and design inspiration for the collection. To ensure the fashion collection developed in this study reaches a genuine target audience and gains exposure through reputable brands, a partnership is established with HeySTARTIC, a local Indonesian brand dedicated to promoting sustainable fashion. During this stage, innovative creativity is applied following the Geneplore model, comprising two key phases: The Generative phase, employing divergent thinking, and the Exploratory phase, utilizing convergent thinking. Preinventive exploration, a component of the Geneplore process, facilitates the exploration of various possibilities through mental simulation and visualization, encouraging diverse idea generation to enhance the likelihood of finding innovative solutions. Preinventive interpretation, the subsequent

step in the Geneplore model, involves assessing and comprehending the ideas or solutions generated during preinventive exploration.

4. Development: At this stage, sketches are produced, and design prototypes are created based on the synchronized information and ideas from the previous stage. Moreover, since this study is about upcycling, the process of transforming plastic bags waste into plastic yarn also takes place in this phase.
5. Refinement: In the refinement step of the conceptual design framework, the focus shifts to enhancing the initial designs. This enhancement may involve adjustments to the initial design itself, shape, functions, or details.

Below (Figure 4) is the research roadmap built upon the conceptual design for upcycling fashion framework. It provides guidance for each step, outlining the analysis and focus areas required during the design process.

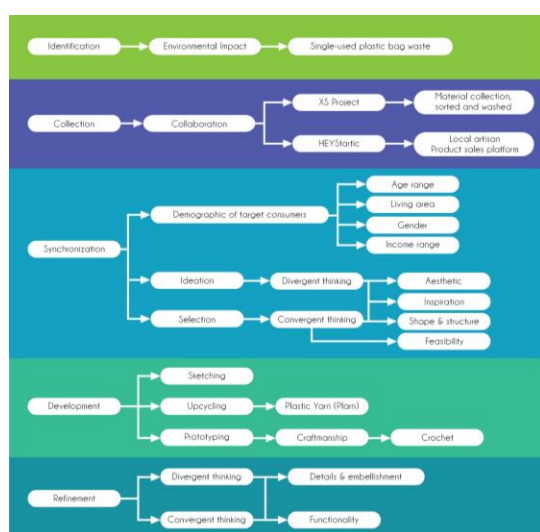


Figure 4: Research Roadmap by employing Conceptual Design for Upcycling Fashion

RESULTS AND DISCUSSION

This study aims to develop a method for upcycling fashion design by integrating relevant concepts and design theories while also utilizing plastic waste. To guide this design process, we created a framework named 'Conceptual Design for Upcycling Fashion,' consisting of five steps: Identification, Collection, Synchronization, Development, and Refinement.

The study identifies the extensive plastic waste problem in Indonesia, specifically single-use LDPE plastic bags, which become the main material for the design development. Single-use plastic bag waste is sourced through collaboration with XSProject, an Indonesian organization that partners with local trash pickers to collect non-biodegradable plastic waste. Another collaboration is made with HeySTARTIC, a local Indonesian brand, to reach a genuine target audience. HeySTARTIC's target consumers include millennials, Gen Z urbanites, locals, and expats in Indonesia's major cities, primarily women aged 21-35, who value sustainability, unique designs, and ethical production practices. Additionally, their consumer profile is a tech-savvy woman aged 21-35, residing in major Indonesian cities like Jakarta or Surabaya. She is environmentally conscious, avoids single-use plastics, and prefers sustainable products. With a busy lifestyle, she appreciates smart-casual clothing with artistic and cultural elements, fitting her modern minimalist living space. This

information is visually represented in Figure 5.



Figure 1: Consumer Board

By employing the Geneptore model, during the generative phase, a multitude of ideas are generated to explore the aesthetic and inspiration for the design theme, focusing on the prevalent colors of white, black, and red found in plastic bag waste. In the exploratory phase, ideas from the generative phase are assessed to further develop promising concepts. The chosen aesthetic is inspired by Balinese culture, particularly 'Tridatu,' symbolizing the cycle of life. This inspiration is depicted in a mood board for the collection named Samsara (Figure 6), reflecting the concept of rebirth and the upcycling process. The next step in the Geneptore model involves assessing and understanding the ideas or solutions generated during preinventive exploration. Here, we illustrate the preinventive exploration and interpretation of Tridatu (Figure 7). In this phase, abstract inspiration can be translated into concrete visual representations, which can then be transformed into crochet patterns, forming the basis for designing sketches for this collection.



Figure 6: Collection Moodboard: "Samsara"

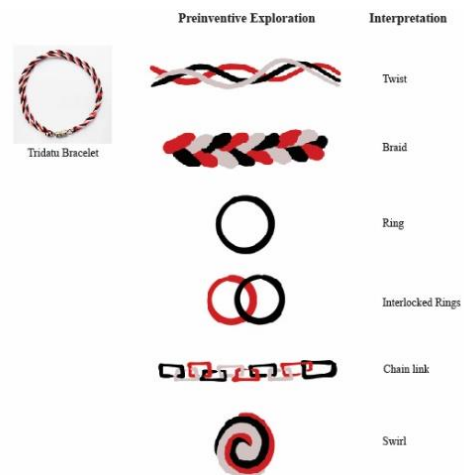


Figure 7: Preinventive Exploration & Interpretation on Tridatu bracelet

In this study, upcycling plastic bag waste was developed using simple tools: scissors and a crochet hook. The process involves folding and cutting the plastic bags to make loops, which are then twisted into a rope. Each medium-sized plastic bag produced approximately 3.1 meters of plastic yarn. Employing preinventive exploration and divergent thinking, 27 design sketches were generated. These sketches then underwent further evaluation for aesthetics, uniqueness, and practicality, using convergent thinking to narrow down the selection to 5 designs. All 5 chosen bag designs incorporate symbolic elements of Tridatu (Figure 8), previously explored in Figure 7.

The final designs are showcased in Figure 9.

Collection Name	Bag Design	Bag Elements	Incorporated Elements From Tridatu Biscuit
Ayuda			
Karua			
Lentat			
Sakua			
Amua			

Figure 8: Incorporated Tridatu elements



Figure 9: Final bag designs

A notable addition in the refinement step is the introduction of "convertibility" as a key feature, offering each bag in the collection at least two different usage options, enhancing versatility. Additionally, all straps across the collection are interchangeable, providing customization options for users and the potential for additional purchases. Metal snap button closures have been integrated into every bag, improving security, with detachable straps also contributing to the bags' convertible style. This attention to detail ensures that each element enhances the overall success of the Samsara Collection in terms of aesthetics, versatility, and customer satisfaction.

Through upcycling, we repurposed 208 pieces of medium-sized single-use plastic for the prototype collection. Integrating the 'Conceptual Design for Upcycling Fashion' framework with the Innovative Creativity model was crucial for maintaining focus and keeping the research on track. The structured approach of the framework ensured consistent direction throughout the study.

CONCLUSION AND RECOMMENDATIONS

The 'Conceptual Design for Upcycling Fashion' framework provides valuable insights for future upcycling fashion projects. It offers a systematic and structured approach, guiding designers through a clear step-by-step process to maintain focus and ensure consistent direction. Developed based on relevant theories, this framework employs systematic design techniques known for their repeatability, logic, and scientific basis. Compared to a design process solely based on creativity, this process-driven approach proves to be more reliable and effective in devising focused solutions to upcycling challenges.

Recommendations:

1. Implementation in Future Projects: We recommend implementing the 'Conceptual Design for Upcycling Fashion' framework in upcoming upcycling fashion projects and studies to guide and structure the design process effectively.
2. Continuous Improvement: As the field of upcycling fashion evolves,

we recommend regularly updating and refining the framework to incorporate new insights, technologies, and innovative practices, ensuring its relevance and effectiveness over time.

By implementing these recommendations, designers and researchers can leverage the 'Conceptual Design for Upcycling Fashion' framework to enhance the sustainability and creativity of upcycling fashion projects, contributing to the development of more innovative and focused solutions in the field.

REFERENCES

- Au, J. (2018). Development of Innovative High-Fashion Collection Via Conceptual Design Process Model. *Journal of Textile Science & Fashion Technology*, 1(2). <https://doi.org/10.33552/JTSFT.2018.01.000507>
- Au, J. S., & Au, Y. H. (2018). Creation of Conceptual Fashion Design Process Model. *Journal of Fashion Technology & Textile Engineering*, 06(02). <https://doi.org/10.4172/2329-9568.1000171>
- Blair, C. S., & Mumford, M. D. (2007). Errors in Idea Evaluation: Preference for the Unoriginal? *The Journal of Creative Behavior*, 41(3), 197–222. <https://doi.org/10.1002/j.2162-6057.2007.tb01288.x>
- Brouwer W. (2020). Geneplore: theory ready for practical use. CQ20. <https://www.creativityn.com/publication/cq20-geneplore-theory-ready-for-practical-use/>
- Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, 3(7). <https://doi.org/10.1126/sciadv.1700782>
- Glăveanu, V. P., & Tanggaard, L. (2014). Creativity, identity, and representation: Towards a socio-cultural theory of creative identity. *New Ideas in Psychology*, 34, 12–21. <https://doi.org/10.1016/j.newideapsych.2014.02.002>
- Koch K. M. (2021). Clothing Upcycling in Otago (Ōtākou) and the Problem of Fast Fashion.
- Obara Kai, F., Baggio Fabricio, A. C., Dircksen Miranda, H. B., & de Souza Martins, S. C. (2022). Upcycling Process: Consumer and Organization Perception. *Revista de Gestão Social e Ambiental*, 16(1), e02881. <https://doi.org/10.24857/rgsa.v16.2881>
- Reiter-Palmon R, & Murugavel V. (2020). Problem finding In M.A. Runco & S.R. Pritzker. In *Encyclopedia of creativity* 3rd Edition (pp. 250–253). Academic Press.
- Ruppert-Stroescu, M., & Hawley, J. M. (2014). A Typology of Creativity in Fashion Design and Development. *Fashion Practice*, 6(1), 9–35. <https://doi.org/10.2752/175693814X13916967094759>
- Sung K. (2015). A review on upcycling: current body of literature, knowledge gaps and a way forward. *International Journal of Environmental*

and Ecological Engineering, 2(4), 28–40.

Sung K. (2017). Sustainable production and consumption by upcycling, Understanding and scaling-up niche environmentally significant behaviour.

Sung K. (2023). Understanding Upcycling and Circular Economy and Their Interrelationships Through Literature Review for Design Education. International Conference On Engineering Design, ICED23.

UNEP. (2018). Single-Use Plastics: A Roadmap for Sustainability. https://wedocs.unep.org/bitstream/handle/20.500.11822/25496/singleUsePlastic_sustainability.pdf

Wegener, C. (2016). Upcycling. In Creativity — A New Vocabulary (pp. 181–188). Palgrave Macmillan UK. https://doi.org/10.1057/9781137511805_22

Wigert, B. G., Murugavel, V. R., & Reiter-Palmon, R. (2022). The utility of divergent and convergent thinking in the problem construction processes during creative problem-solving. Psychology of Aesthetics, Creativity, and the Arts. <https://doi.org/10.1037/aca0000513>