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A Creative Apparel Up-cycling Design Development Using Creative Thinking Methodology

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creative thinking methodology,
heterotopia spacial concept

Abstract

Fashion is the second most polluting industry. We must strive to transition to a form of industry that does not cause environmental pollution. These efforts drive may fashion brands to produce and sell products with redesigned methods that delight the inventory flow. Accordingly, it is necessary to develop creative apparel up-cycling design using the creative thinking method. This study aims to produce clothing redesign works by introducing design idea types for systematic redesign creation. In this research, we conducted a literature review on the concept of up-cycling design and employed heterotopia spacial concept reflected fashion design creation methodology types. The RE:CODE, a leading domestic up-cycling design brand, was used in case analysis. According to the command of shape transformation, it is spreading, stacking, dropping, inverting and crossing, from the creative thinking method reflecting heterotopia spacial concepts, showing designers a concrete way to transform form into new apparel. Seven works of apparel up-cycling design were developed by conducting process of RE:CODE. Also, to establish an apparel up-cycling design creation process for creating works. In this study, we proposed a systematic method for apparel up-cycling design, including a method for reorganizing two or more different materials to create something new and ultimately reversing the structure. The value and significance of this study is that it proposes a systematic method for apparel up-cycling design to make it new.

I. Introduction

1. Background

Fashion is one of the main industries causing environmental pollution. Environmental pollution caused by landfill or incinerate of stocked clothing and fabric are increasing. Apparel redesign brands using discarded stock clothing are increasing. The apparel redesigning method is spreading as a design type that can reduce environmental pollution by renewing vast inventory of clothing. Redesign is different from the general clothing design process, and the prediction of the result is difficult compared to the general clothing design process. There are difficulties. In order to vitalize apparel redesign, a systematic apparel redesigning method is required to develop redesign with trends and commercial properties. Creative thinking methodology is a very important intellectual ability to become a creative professional designer by creating new ideas and solving problems without stereotypes or prejudice (Kim, 2013). There are limited number of creative thinking models in apparel design (Black, Freeman, & Stumpo, 2015 ; Lee, Lee, Hwang, Choi, & Kim, 2019). Previous research on apparel redesigning involves on characteristics of materials , techniques and formativeness (Yu & Chun, 2020; Chen, Yang, & Lee, 2021) and apparel redesign creation using specific dead stock clothing such as tailored jackets and denim (Heo, 2019; Lee & Yim, 2015). Also there are prior studies on apparel redesigning using the details of clothes and basic fashion design education courses from a sustainable perspective, but research on the production of apparel redesign works using creative thinking methodology is insufficient. Therefore it is necessary to promote the revitalization of redesign by utilizing systematic creative thinking methods for apparel redesigning creation. The purpose of this study is to create apparel redesigning works that can promote creative apparel redesign by applying creative thinking methodology.

2. Method and Scope

In this research we conducted literature review on the concept of redesign and employed Kim(2017) as a principles of creative thinking methods for creating redesign apparel. Also as for an empirical study, we conducted case study to verify characteristics of apparel redesign with a perspectives of creative thinking methods of Kim(2017). RE;CODE, a leading domestic redesign brand, was used for case analysis. The discarded apparel resources for the creation of the work were provided from global outdoor clothing company and abandoned fabrics were provided from domestic designer brand. We create 7 designs using discarded materials such as abandoned clothing and fabric.

II. Literature Review

1. Creative Apparel Up-cycling Design

There is a traditional pollution-prevention hierarchy of 3R as the best pollution-control option, which is to reduce, reuse, and recycle. Green architect Bill McDonough (1951~) suggests the concept of redesign as a way to find new opportunities to add value before doing 3Rs (Esty & Winston, 2006). Up-cycling is a design type that breath new life into abandoned material with creative idea. As a measure for sustainable development, it reduces environmental pollution and give new value to wasted resources. It is an eco-friendly fashion design that can have effects such as economic benefits and reduction of environmental pollution caused by waste disposal. It has been presented as a new style of 21st century in apparel industry while the awareness of apparel up-cycling brands are increasing due to the environmental pollution. Over 150 billion garments are produced in the world each year (Koperniak, 2015). A family in the Western world throws away an average of 30 kg of clothing each year. Only 15% is recycled or donated, and the rest goes directly to the landfill or is incinerated. Environmental pollution continues to be serious because of the incineration of clothing that is not

chosen by consumers, but there are few alternatives for solving this problem. The sheer volume of unused inventory, estimated at around \$120 billion, casts a huge shadow over the future of the industry (Khatib, 2000). There are already too many garments being produced: because more clothing is produced than is necessary, there is an inventory left. This is becoming a vicious cycle that poses a threat to the environment. A fashion designer's competency is required to redesign clothes to be fashionable, because much of a product's environmental impact is firmly established in the design phase (Esty & Winston, 2006; Claxton & Anthony, 2020). Recently there has been a new trend of eco-friendly luxury apparel made from 'deadstock' (Choi, 2021). French fashion designer Marine Serre, who won the 2017 LVMH Award, has been praised for using the stock in her Spring/Summer 2020 collection: Approximately 50% of the Spring/Summer 2019 collection, for instance, was crafted from abandoned materials (Silbert, 2019). Priya Ahluwalia, the rising London-based designer, created her collection using deadstock that came from wholesale recyclers and bigger brands. Many more brands need to participate in redesigning using deadstock to become the "third wave" of the fashion world, which presents a real opportunity for innovation and could make a significant difference in dealing with the mounting clothing-waste problem (Byrne, 2020). Much of the abandoned apparels are given a new value by being redesigned by the apparel designer's competency and they will play a key role in the development of creatively.

2. Creative Thinking Methodology for Apparel Up-cycling Design

2.1 Creative Thinking Methodology for Creative Apparel Up-cycling Design

Creative thinking methodology plays important role in promoting creative solution through the process of deriving creative ideas (Ward, 2001; Lee, Kim, & Park, 2019). Creativity is a backbone in fashion design. Previous studies have been showed that creativity can be

developed with creative-thinking strategies (Özyaprak & Marilena, 2019).

A fashion designer's competency is required to redesign clothes to be fashionable because much of a product's environmental impact is firmly established in the design phase (Esty & Winston, 2006; Claxton & Anthony, 2020). But there are limited number of creativity models in apparel design (Black et al., 2015) as well as apparel up-cycling design. Unlike the general fashion-design process, it need to seek creative idea for abandoned apparel to become a new design. The process of apparel up-cycling design is not the same as that of traditional fashion design (Janigo & Wu, 2015). Therefore it is necessary to come up with an creative thinking method just for up-cycling design.

2.2. Heterotopia Spacial Concept Reflected Fashion Design Creation Methodology Types for Apparel Up-cycling Design

Heterotopia refers to a unique phenomenon in a location, such as 'heterogeneous transplantation' or 'heterogeneous composition'. Hetero spacial concept a space of anxiety where heterogeneous elements are mixed and unusual objects are combined Kim(2017). Thus it is a creative thinking methods about generate idea to coexisting of unusual and different material together in a same apace. And the core process of creating clothing redesign begins with dismantling the disparate materials and details of discarded clothing and thinking about how to reconstruct them. This is a creative thinking methodology type that can be applied as an idea for apparel up-cycling design. It takes a lot of experience to develop the skills and sense of deconstructing and reconstructing clothes and having them reborn as new designs (Kim, 2021). Ideas for deconstructing and reconstructing already existing various inventory clothing are required.

Kim(2017) presented five shape transformation methods: spreading, inverting, dropping, stacking, and crossing to represent shape transformation in fashion design where unusual materials coexist. Each type is a apparel redesign technique to reflect the 'heterotopia

spacial concept' of contradiction, overturn, deviation and complexity derived through analyzing the formativeness of architecture, painting (Figure 1).

It is a creative thinking method that provokes strong associations by forcibly giving hints of instruction of five words. It can be a method of creating creative fashion design by stimulating ideas for deconstruction and recombination of forms.

III. Apparel Redesign Case Study Analysis

1. Characteristics of Apparel Up-cycling Design and Process Analysis

RE:CODE, Korea's leading apparel up-cycling design brand, launched in 2012 and created by Kolon Fnc, currently owns over 20 fashion brands, including

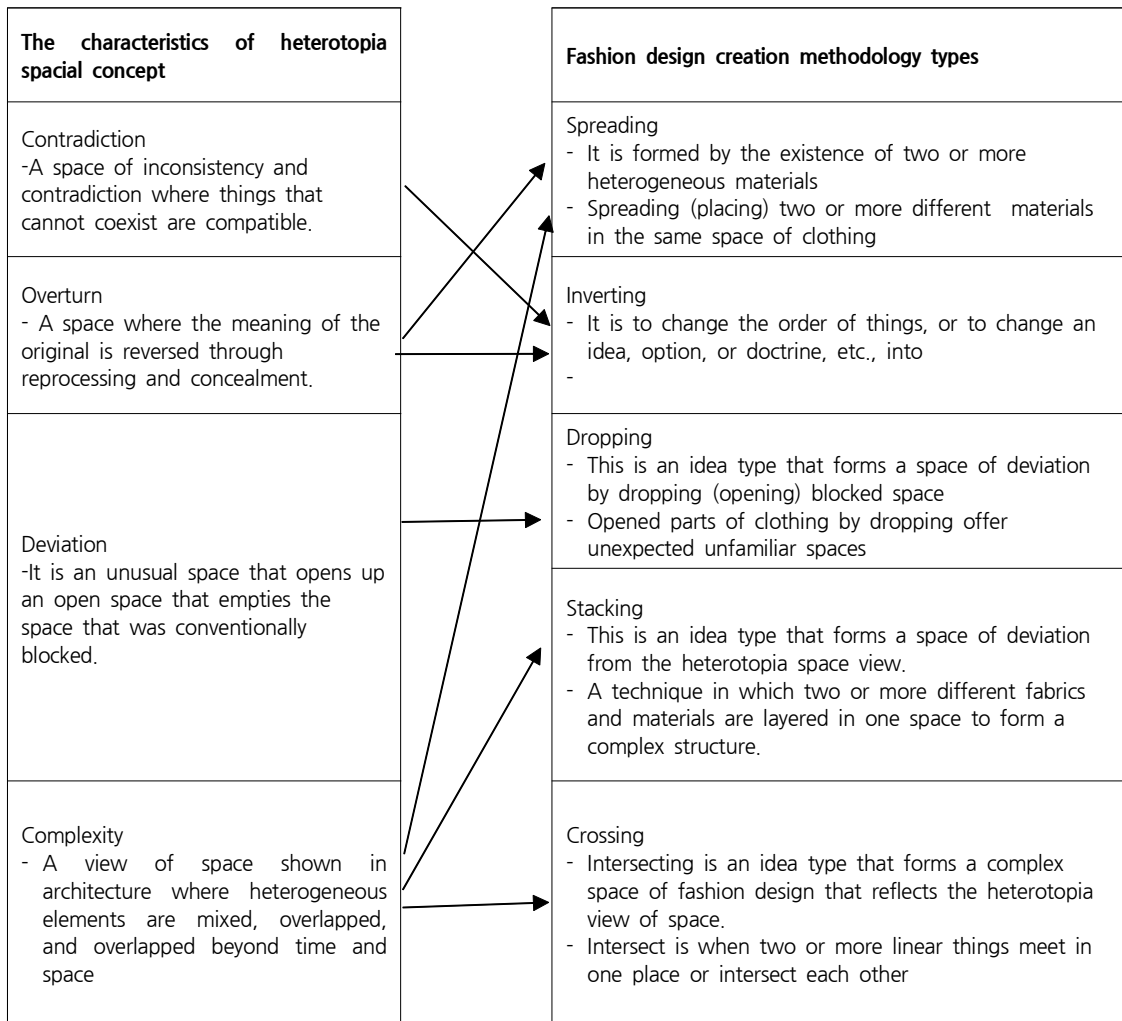


Figure 1. Heterotopia Spacial Concept Reflected Fashion Design Creation Methodology Types (Modified from Kim, 2017)

overseas premium brands, such as Marc Jacobs, and Berluti in the domestic market. Kolon Fnc has been struggling with clothing inventory following annual sales of 1.5 trillion won. The company tried sending the overstock overseas, dumping it, and donating it, but doing so generated problems and damaged the brand value. The cost alone amounted to 40 billion won per year for incineration (Yang, 2015). To solve this problem, Kolon Fashion launched RE: CODE, the first redesign brand of a large corporation, in 2012. The characteristics of apparel up-cycling design of RE:CODE with a perspective of creative thinking methodology reflecting the heterotopia space concept (Kim, 2017) were analyzed as follows.

1-1. Spreading

Spreading is to arranged and to form coexistence of two or more heterogeneous materials in the same space. Sleeves and part of body is spreaded with different two fabric and colors(Figure 2). Two different fabric and

technique are coexisting (Figure 3) and More than 4 different types of fabric is spreaded like blocks in the shirts (Figure 4). More than two different types of material are aligned in vertical direction, horizontal direction and diagnol direction. It is a creative redesign method by coexisting different abandoned material such as pleated fabric, different color and texture.

1-2. Inverting

Inverting is to change the order of things to change idea, option or doctrine into something different from original or ordinary. The inside of a tailored jacket was turned inside out and attached to a sweater (Figure 5) and Figure 6 is a design that reverses the inside and outside, removes the sleeves, and reconstructs it into a vest. Oversize men's shirt were rotated 90 degrees from the center and creating new neckline (Figure 7). It is a design method that completely renews the purpose and structure of existing apparel by flipping it over or changing its location. As the structure of everyday



Figure 2. *Jacket Sleeve Mixed Sweatshirt*
(www.kolon.com)



Figure 3. *Unbalanced Pleats Top*
(www.kolon.com)



Figure 4. *Fabric Puzzle Printing T-shirts*
(www.kolon.com)



Figure 5. *Jacket Oversized Turtle Neck*
(www.kolonmall.com)



Figure 6. *Inside Out Jacket Vest*
(www.kolonmall.com)



Figure 7. *Unbalanced Green Check Shirts*
(www.kolonmall.com)

clothing is overturned, an unfamiliar clothing space is created.

1-3. Dropping

This is a technique that opens a previously blocked space by dropping a specific part of clothing and it is creating a deviant space in an unfamiliar space. The sleeves were dropped from the armhole, and an unexpected space is formed below the slit detail. (Figure 8)(Figure 10). Figure 9 shows a tailored suit where part of the waistline is not sewn and is left open. The open space by dropping changes depends on what is located inside. It becomes an unfamiliar space that continuously changes depending on the structure and fabric located in the open space. This is a technique of creating an unstructured space by inadvertently dropping items rather than removing them with a detailed plan.

1-4. Stacking

Stacking means placing many objects from bottom to top and it forms a complex space (Kim, 2017). This is a short-sleeved t-shirt with patchwork of the sleeve lining of a suit jacket over the front of the t-shirt (Figure 11). Figure 12 is a V-neck woven top created by deconstructing a men's white stock shirt and layering it asymmetrically on only one side of the top of the shirt. Flared fabrics are on top of the reconstructed skirt which was deconstructed from men's trousers (Figure 13). Stacking forms a complex space through duplication and overlapping. There is a big difference in the results of stacking depending on the surface structure and volume of the material, so it is important to select a material that suits the purpose of the design.



Figure 8.
Slit Shoulder Top
(www.kolonmall.com)



Figure 9.
Voluminous Sleeve Linen Jacket
(www.kolonmall.com)



Figure 10.
Cut Out Raw Detail Sweatshirts
(www.kolonmall.com)



Figure 11.
Jacket Lining Patched T-shirt
(www.kolonmall.com)



Figure 12.
Shirts Panel Patched Woven Top
(www.kolonmall.com)



Figure 13.
Fabric Mixed Skirt
(www.kolonmall.com)



Figure 14. *Big Pleats Crop Knit*
(www.kolonmall.com)



Figure 15. *Round Neck Knitwear with Bustier Top*
(www.kolonmall.com)



Figure 16. *Jersey Mixed Bomber Sleeve Bolero Cardigan*
(www.kolonmall.com)



Figure 17. *Half Bustier*
(happy.designhouse.co.kr)

1-5. Crossing

Crossing refers to two or more lines meeting at one place or crossing each other.

If the heterogeneity of the elements to be crossed is not related to clothing, it is separated from the clothing, but on the contrary, intersection using similar elements clusters the similarities and is recognized as a harmonious change (Kim, 2017). Figure 14 is an unbalanced cropped knit made by cropping a men's knit pullover and adding colored pleat details. A design that adds uniqueness by stacking the bustier design of an abandoned suit on a round shoulder solid knit and fastening the strings in the cross direction (Figure 15). Figure 16 is a unique design created by attaching the deconstructed sleeves under the sleeves of a discarded sports knit top. It is intended to be worn like a bolero cardigan item, and has a structure that fastens by crossing the sleeves, creating an unfamiliar space by reorganizing the structure for fastening rather than sleeves. Crossing is a type of idea that complicates space by intersecting two or more homogeneous or heterogeneous materials.

2. 3 Steps of Apparel Up-cycling Design Process





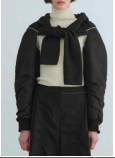
According to the up-cycling design process through apparel redesign brand RE:CODE analysis, it is divided into three steps of selection, deconstruction, and reconstruction. The work process of making clothes

from deadstock clothes is more complicated than is that of making clothes in general. It is also difficult to predict what the outcome would be, because it was an attempt that had never been done before (Kang, 2019; Choi, 2021). A half bustier (Figure 17) tied with detachable and worn with buckled straps presented in the 2019 F/W collection was completed with the fashion-design process used by RE:CODE (Kang, 2019). At the beginning of the design process for the half bustier, a designer selected a men's jacket out of deadstock clothes and deconstructed it. The parts of the jacket that were disassembled into pieces were reconstructed into a bustier. The selection of items that can be used for up-cycling design among the remaining garments before disposal and the deconstruction of clothes into pieces or into parts is a design process that exists only in RE:CODE (Kang, 2019). The core of RE:CODE's design is to propose a completely different design by adding a new perspective to the existing standardized items by using its own design process (Kim, 2021). In this chapter, we analyzed the five types of creative ideas suggested in Kim's study by applying them to the apparel up-cycling design process of RE:DCODE (Table 1).

IV. Apparel up-cycling design creation

Fashion design development method by the heterotopia spacial concept provides fashion design creation methodology to make unfamiliar and unique apparel

Table 1. *Creative Think Methodology Principle Analysis with 3 Steps for Apparel Up-cycling Design Process*

Principle of creative thinking methodology	Selection	Deconstruction	Reconstruction	Completion
Spreading	-Sweatshirts -Sports jumper -Tailored jacket	-The parts of Sweatshirts and sports jumper -Jacket's sleeves are deconstructed	- Sweatshirts, sports jumpers, jacket sleeves placed right next to each other -Three different elements are spreading -Spreading is a method during the reconstructing stage	
Inverting	-Tailored jacket	-Tailored jacket's bodice is deconstructed	- Reconstruct discarded jacket by inverting the structure of clothing - Inside of jacket details are creating new vision for creative idea	
Stacking	- Men's trousers - Abandoned fabric	- Men's trouser deconstructed	-Deconstructed men's trouser reconstructed into a skirt - Draped skirts are stacking on top of the reconstructed black skirt.	
Dropping	-Sweatshirts	- Sweatshirts armhole seamline is deconstructed	- Adjust amounts and reconstruct until satisfactory opening is achieved.	
Crossing	- Bomber jacket - Knit sweater	- Bomber jacket sleeves are deconstructed - Crossed Knit sweater's	- This reconstructed cardigan features bomber jacket sleeves and a cross-sleeve knit top.	

design with five types of methods which are spreading, inverting, dropping, stacking and crossing. Also we applied three steps as for apparel up-cycling design creation systematically.

The work 1 is a long padded coat. The first step for selection of the discarded item and we decided to choose a light padded gray jumper. To make it into a long coat, we needed some spare discarded fabric to match with gray jumper fabric. The jumper was deconstructed into square pieces to make long padding. We developed a quilted material that expressed mountain motifs in geometric shapes on fabrics of different colors and spreading them vertical direction at regular intervals.

The square pieces of the jumper and the spare fabric developed from the mountain motif quilted fabric were reconstructed in a regular vertical direction. Three heterogeneous elements are mixed, arranged, and it creates a space of complexity in the clothing.

The work 2 we created is a cape jumper. For this windbreak jumper are selected as a selection stage and 'stack' method is applied as a creative thinking methodology. The damaged part of the garment is deconstructed. Extra fabric was draped over the jumper to transform it into a cape which were stacked on the jumper. Stacked parts were designed with digital printing detailed extra fabric by applying spreading method

tighten with string detail is added. The stacked part was designed with fabric developed through digital printing and details that can be tied with strings were added to emphasize a sportive trend. Stack method was applied. Heterogeneous elements such as cape and digital printed part were stacking and spreading and it a space of complexity in the clothing.

The work 3 is a padded jumper dropping method was applied. It was redesigned by selecting a lightweight quilted padding jumper. At the beginning of the deconstruction stage we planned to open up parts of a jumper of sleeve and bodice to create deviation space. When it deconstructed sleeve and part of bodice are dropped to shape transformation. Loose Stack methodology was also applied to this work.

The work 4 was applied inverting and spreading as a creative thinking methods. Heavy padded jumper shell color was dull and The structure was inverted by turning the jacket inside out. Also to enrich the design of the sleeve with balloons, the sleeve seam line was torn off and a smoking effect was added to the excess fabric. The added material was reconstructed by spreading it with the deconstructed sleeve parts. Starting from the front neckline to the hemline, extra wool material was used to drape and sew. The fabric sewn on the seam line has been reorganized into a structure where it is stacked on the jumper.

The work 5 began with a selection of three different styles of jackets. The front and back panels were completely deconstructed in half to reconstruct with unbalanced structure. The jumper was deconstructed in half and arranged in front, back, and down, respectively, to reconstruct it into a long coat. Front center around neck was arranged with denim jacket composition.

The work 6, mint color light padded jacket was selected. Deconstructed bottom parts of the jacket was placed in upside down around the neckline position. Inverting method was applied. Using the dropping technique, one shoulder is separated, creating a heterotopia deviant space where the shoulder space is opened.

For the production of work 7, a children's jumper was selected. The jacket was deconstructed into a square geometric shape to utilize the front outer pocket. The creative line was planned in a diagonal direction, and the deconstructed jacket's elements and extra fabric were arranged in a diagonal direction and reconstructed into an unbalanced shirt. Three different elements of blue panel from deconstructed jacket, purple stripe jersey fabric and multi striped fabric were composed. It created complexity space based on the heterotopia spacial concept. Table 2 is a development process of 7 apparel up-cycling design work process by creative thinking methodology reflecting heterotopia spacial concept.

Table 2. Apparel Up-cycling Design Work Process by Creative Thinking Methodology Reflecting Heterotopia Spacial Concept





	Selection	Deconstruction	Reconstruction	Completion
Work1				
	Grey padded jumper	Jumper was deconstructed into square shape pieces	Square pieces from jumper and extra fabric quilted were reconstructing	Spreading method was applied > Complexity space by

Table 2. Continued

	Selection	Deconstruction	Reconstruction	Completion
Work2				
	Black windbreaker jumper	Remove contaminated and damaged shoulder fabric.	Cape structure was added on the jumper	Stacking method was applied
Work3				
	Navy padded jumper	Deconstructing the chest and sleeves of the jumper	Dropping sleeves structure are created and extra fabric were spread as for sleeve	Dropping method was applied
Work4				
	Winter jumper	Decinstructing hoody and closing structure of the front	Adding extra fabric in opening space of the skeepve and front	Spreading and stacking methods were applied

V. Conclusion

Up-cycling design is a design method that can reduce environmental pollution, and the number of successful redesign fashion brands is increasing. Apparel up-cycling design should be developed systematically as an one of

the fashion design types. and through this, we can expected to revitalize the apparel up-cycling design industry. In this paper, seven apparel up-cycling design works were created using creative thinking methodology from Kim(2017). According to the command of shape transformation, spreading, stacking, dropping, inverting

Table 2. Continued

	Selection	Deconstruction	Reconstruction	Completion
Work5				
	Three jumpers	The jumper was deconstructed in half	Two halves of a jumps were arranged the and another grey jumpers are placed underneath two jumpers. Stacking underneath of the tow jumper	Spreading and stacking method were applied
Work6				
	Light padded jacket	Upper parts and bottom parts are deconstructed separately	The bottom part was positioned upside down and rearranged into a high neck.	Inverting , dropping method were applied
Work7				
	Kid's jumper	Front part are deconstructed	Three different fabric were arranged with tilted angle	Spreading method was applied

and crossing, from the creative thinking method reflecting heterotopia spacial concept show designers a concrete way to transform form into new apparel. 7 works of apparel up-cycling design were developed. Also, in order to establish a clothing redesign creation process for

creating works, we applied the design process of the apparel up-cycling design brand. The method of spreading two or more different types of fabrics in a same place creates a complexity space in a apparel up-cycling design, and for this, the designer's idea of

harmoniously combining various fabrics is important. The method of dropping parts of discarded clothes is performed for various reasons: to remove parts due to contamination, to open a blocked space to reveal the inner space, and to open the seams and reorganize the open space with new materials. It is used in apparel up-cycling design. The inverting method can create a new structure by swapping the top and bottom of discarded clothes or turning the outside and inside. Stacking is a design method that devises creative designs by adding heterotopic materials or structures to the discarded clothing. The process of deconstructing and reconstructing selected inventory clothing is the core process of apparel up-cycling design, but it is different from the general design process and is not presented systematically. In this study we proposed a systematic method for apparel up-cycling design, including a method for reorganizing two or more different materials to create something new, and completely reversing the structure. The value and significance of this study is that it proposes a systematic method for apparel up-cycling design to make it new. In follow-up research, we can look forward to empirical studies producing apparel up-cycling design and examining consumer satisfaction.

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