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Chaos with Electronic Waste

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Key Words: Sustainability, Electronic Waste, Wearable Art, Knitting

Contextual Review and Concept. In the current technology-driven society, new electrical and electronic equipment (EEE) (e.g., smartphone, computer, charger, electronic wire) are introduced to the world constantly and we are surrounded by EEE in our daily living. Technological innovation constantly fosters to launch a new type of EEE which is commonly appreciated in the mass market at the beginning but after a few years of its lifespan, it becomes quickly outdated, generating electronic waste (e-waste) (Rautela et al., 2021). This e-waste is causing another environmental concern by producing a huge solid waste. Garcia-Morales (2011) argued the importance of advocating this e-waste problem through museum exhibitions, which would be helpful to bring various stakeholders' attention to this serious environmental cause. According to Zhang (2016), wearable art is one impactful communication mean to portray societal issues. Thus, this wearable art piece was intended to portray the dark side of technological innovation occurring in our society and voice up sustainability awareness through abundant e-waste to the public. This experimental design was particularly the outcome of contextualizing e-waste as a wearable visual element through connecting with societal chaos, which is well aligning with the Congress theme, *Home Economics: Soaring Toward Sustainable Development*.

Visual Impact and Aesthetics. With sustainability awareness in mind, the design inspiration was derived from the entangled electrical cords. The designer focused on articulating e-waste into a wearable art piece that portrays hazardous dumped e-waste in our chaotic technology-driven society. Using hand-knitting techniques, the designer tried to showcase the visual expression of the chaotic mass with e-waste to the public; especially, 3D textures of fringed and tangled yarns formed a depth in the knitted fabric. The hand-knitted textiles used for this design also portray abundant e-waste residing in landfills, which bring public awareness for the responsible consumption and production.

Process, Technique, and Materials. Multiple steps were involved to create this design: design ideation, material collection, experiments of textile manipulation, fabric creation, garment draping, fitting, and assembly. The designer created multiple fabric swatches using various yarns to resemble entangled electrical cords (see Figure 1). Although yarns and electronic cords have the same traits being long and thin in shape, yarns are softer to touch human body; thus, becoming the core material to use for this design, considering its wearability. A

Figure 1. Fabric manipulations

hand-operated bulky knitting machine was used to produce knitted fabrics. Two knitting techniques, picot and vertical weaving, were applied to form dimensional fabric textures and utilized to create the front and back fabrics for the top, respectively. The vertical weaving enabled layering materials over and over to depict a pile of entangled electronic cords. After the knitted fabric was detached from the knitting machine, a hand stitching technique was used to apply mesh tubing into the fabric, which helped to depict the chaotic jumbled mess of e-waste.

Five times of model fittings were performed to construct this wearable art that is comfortable in terms of fit and mobility. The front and back of the knitted top were manipulated, casting on 100 stitches and hand-knitting of 150 rows. Then, the knitted fabrics were attached on the fitted inner top. The inner top was produced in multiple skin tones to accommodate diverse wearers and with the intention of not standing out from the rest of the garment. Lastly, the skirt was produced with tulle and chiffon fabrics, piping rubber strings, yarns, and meshing tubes at each hem of tiered layers. Most yarns and rubber strings used in the skirt were from discarded materials in a design studio. The skirt silhouette with a large volume was intended to illustrate the exploding society with e-waste. The yarns with warning colorations (e.g., orange, yellow) at the skirt bottom were intentionally loosed to portray the electronic cords.

Cohesion and Contribution. Chaos with Electronic Waste well portrayed the dark side of technological innovation occurring in our society through depicting the entangled electronic wires in this wearable art piece. The hand-knitted textiles showcased jumbled cords of e-waste with various yarns, leading sustainability awareness of e-waste to our living communities. This design is not only for showcasing aesthetically pleasing 3D structured wearable art but also for bringing the public awareness to environmental concerns that are deriving from discarded electronic devices we use every day in our current technology-driven society. This design well aligns with the Congress theme, *Home Economics: Soaring Toward Sustainable Development*, by addressing dynamic interrelationships of human beings with human-built, societal, and natural environments through disruptive technological innovation.

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Cultural Commodification and Combo with Functional *Adire* (Tie/Dye) of Yoruba Nigeria

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Keywords: Yoruba Adire, Design Innovation, Cultural Commodification, Sustainability

Yoruba indigenous textiles - *Aso Ofi* (Cloth woven on narrow loom) and the *Adire* (Tie/Dye fabric) are basic cultural textiles of the Yoruba worn mainly during occasional or cultural outings (Adesanya**,** 2014). While *Aso Ofi* is purely produced from the interlacing of warp and weft yarns at right angles on the loom, the *Adire* basically involves a decorative process where various resist mediums of: tie/dye, batik, and printing in different forms are used for coloration to create variety and ingenuity of aesthetics. Several locally produced commodities like *Aso Ofi* and *Adire* need expansion to aid technological advancement that would encourage self-reliance and break the unhealthy rivalry its experiencing with foreign textiles in order to sustain the culture of Yoruba clothing through improved patronage.

The design being showcased here: '*Full Length Female Combo' is a product of multimedia design Adire* that was embellished with the 'seer-sucker' design of *Aso Ofi* in Awosika (2016), which is in consonance with the theme of the IFHE Congress 2022- ***Soaring toward Sustainable*** **creative application of technology, surface design, and sustainability.** This product is apt at this time when the challenge of the influx of imported synthetic textiles into Nigeria and the mono economic dependence on the oil sector had resulted into impoverished conditions of citizens. A great need for diversification into indigenous technology of *Aso Ofi* weaving and *Adire* –dyeing to fast track their growth potential and provide job opportunity for people along the value chain of cultural textiles to reduce poverty.

The *Roomy Full Length Female Combo* was produced from a multi-media design concept which involved both Tie/Dye and Batik designs applied on 100 percent cotton 4 yards of white cotton brocade fabric. The white brocade was pre-shrunk by soaking overnight in ordinary water to dissolve and remove the stiffening agent, chemical and other factory finishing effects that could tamper with resisting agents and dyeing. The Design used was a combination of a scholarly thought out research that is interpreted in a distinctively creative manner involving different forms of tie/dye: big circular tying with strings and marbling in combination with and Batik mediums like: freehand waxing, sprinkling, and use of stamping block as resist forms methods and dyed into light blue hues, green, wine and some touch of black to give a tertiary coloration effect at various stages following the positions of Shuaib and Awosika (2016) and Iweka, (2019). After dyeing, the designed textile was cut into a Size 12 roomy adult *Full Length Female Combo* with a round neckline and sewn into a long gown with a curvy hemline. The design was further embellished around the neckline down the chest section in front with a Leafy Green and pale yellow *Aso Ofi* woven in the seer-sucker design that has an inclusion of metallic glitter threads to pep-up the intended aesthetics. Viewers of the *Full Length Female Combo* would find is to be intellectually inspiring and creatively appealing as a concrete aesthetic piece and finished according to the position of Awosika, (2008) on innovations in dress making.

Schools of thoughts like Burak (2015) and Karthik and Gopalakrishnan (2014) had aptly pointed out that scientific and technological progress are the keys to African development and poverty eradication through creative processes of technological solutions to identified problems in the aspects of self-discovery, economic diversification, poverty reduction, self-actualization, the quest for cultural commodification, and sustainability (Olakitan (2015) and Obasanho (2017). The processes followed to produce the "Combo" would be able to fast track desirable technological advancement and capacity building of weavers, dyers, dressmakers, and clothing merchants to live above poverty and attract foreign investors for cultural cross-fertilization and growth of the indigenous textile and clothing industry into a globally competitive endeavor. Final finishing was done by giving total ironing to all the features and the entire design allowing it to cool off and shooting its four views as presented below. It is hoped that the inspiration from the scholarly creative piece would be of assistance to textile producers, weavers, merchants and consumers in their quest for capacity building, innovativeness and the satisfaction of wants.

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Dancing Mimosa

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Key Words: Bionic Design Process, Integrated Sustainability, Shape Memory Alloy (SMA), Transformable Fashion

Abstract

How does designer express biodiversity through fashion design? UNESCO has valued the importance of biodiversity in our life for sustainable development to protect ecosystem around the world (UNESCO, 2014). We explored transformable garment to express the value of biodiversity through nature's organic movement. Transformable garment includes reversible / folded styles, modular pieces, smart clothing, and do-it-yourself (Koo, Dunne, & Bye, 2014). We followed bionic design process to embody aesthetically effective transformable garment in this design. Bionic design process has used on engineering design and health devices design by analyzing movement and shape of nature's organism (Wang, Wu, Wang, Li, Yang, and Wu, 2020; Zhang, Wang, Kang, Fuentes, and li, 2020;). Fashion design domain, especially in transformable garment, can apply the bionic design process to embody aesthetically functional clothing to incorporate sustainability using Shape Memory Alloy (SMA) and CLO program (3D fashion design software program creating virtual, true-to life garment visualization, ver. 5.1). Therefore, the purpose of the garment was to create interactive transformable garment for expressing biodiversity with understanding integrated sustainability.

The main inspiration came from the movement of Mimosa leaves. Mimosa, commonly known as *touch-me-not*, responds to touch or heat as self-protection process. While Mimosa folds their leaves, they need a flow of electricity. The leaves react as self-protection process, but human being can enjoy seeing the movement with fun. We tried to express the harmonious aesthetics including technologies, sustainable value of biodiversity. As the first stage of development, we analyzed algorism of Mimosa leave's movement through bionic design process to find out appropriate materials, shape, and location to embody technologies. The appropriate material was SMA: SMA is an adaptive, temperature sensitive alloy being able to return to a pre-programmed shape when stimulated by heat or an electrical current (Wang, Lu, & He, 2019; Winchester & Stylios, 2003). Since the movement depended on number and length of SMA, watt, ampere, and charging time, we searched out the appropriate location on the body to activate SMA sustainably and effectively. As the second stage, we used CLO program to see holistic movement of leaves attaching SMA to activate them effectively. The program could reduce time in pattern developing and material wastes to test technology-embedded clothing virtually. Next, we developed actual design. After making tops and vest with recycled leather on aesthetical meaning, we focused on skirt development with SMA activating. To activate them effectively, thin, semi-transparent but endurable

fabric (rayon organza) was used on the skirt with aesthetical aspect. The inside of skirt has lining with pockets to give volume and to hide technology-embedded materials such as electric wires, batteries. Total 14 individual leaves connected with SMA were sewed on the skirt separately. They were sectioned four around the skirt as of heat-sensitive material (SMA) and long usability with one battery. As a result, the leaves can move left and right on the four different sections, and wearers can control the four sections separately through the developed application on smartphone. Every technology embedded parts was hidden inside skirt, and batteries can be replaced easily.

This design developed to embody integrated sustainability through transformable garment. It has significant value on reducing wastes and time using with CLO program, recycling materials, and applying biodiversity using SMA based on bionic design process in fashion design. This design could expand of using SMA not only for functionality and usability but also for expressing aesthetical meaning through analyzing the movement of natural organism, Mimosa. This can give holistic pleasurable satisfaction to wearer by interactive expression toward integrated sustainability. The design also shows the integrated aspects in transformable garment with understanding environmental situation and problems under pandemic.

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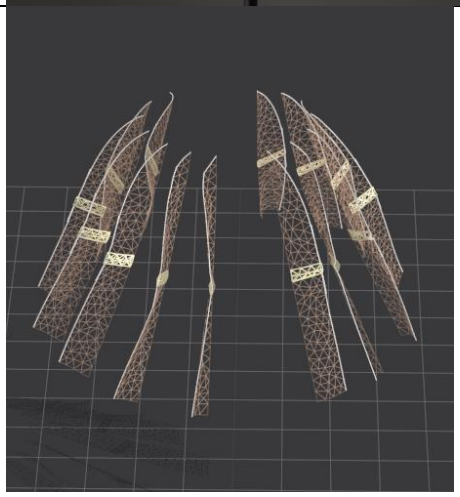
Photos

Front view

Back view

Side view



SMA activation on skirt-CLO programing

You can check the movement of design through the link: https://vimeo.com/546439303

Fiber to Attire

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Key Words: Fiber, Yarn, Weaving, Sewing

The project Fiber to Attire embodies the gradual shift towards more sustainable fashion with both purchased materials and individual craftsmanship. As the world strives to become more sustainable, the products created that may not be as sustainably made will still exist. Rather than dispose them, putting them to use brings them into a more sustainable light. This project uses bought natural fibers sent through a high technology process, an altered premade pattern, and handcrafted aspects such as handspun yarn and weaving the textile on a rigid heddle loom. The design challenge Fiber to Attire addresses is learning how to create fabric from scratch, through spinning fiber into yarn, dyeing the yarn, weaving, and sewing the resulting textile into a wearable coat. The United States is not well known for producing our own textiles, as for this purpose, I desired to push the limits of what I could learn and ultimately create my own textile that has been made in the US. The objective was to create a textile by hand that is simultaneously wearable and sustainable. With the right tools, knowledge, and time, it is possible for everyone to soar towards sustainability, one step at a time.

Visually, the aesthetics of the overcoat soar just as the theme of Soaring towards Sustainability does. The lines of the design are majorly diagonal and all structural, lending a dramatic and sophisticated air to the long panels and high collar. The cap sleeves are rounded and stiffened. Along the sleeve edges, small natural pearls dangle, tying into the pearl powder infused into the textile fibers. The lines along the front of the coat create the illusion of an hourglass. Guiding the viewers eyes throughout the whole garment, starting from the bottom, where the opening is the widest, up to the waist, where the lines converge. Then the lines split again going upwards to create the V-neck and high pointed collar, in the center of which is the face of the wearer. Despite all the work that goes into creating this piece, it is meant to be worn by an individual, not merely placed on display. Hence, the lines guide the emphasis to the wearer of the garment. The color induced by the yarn dyeing techniques creates pattern variations in the textile, as some portions will be white as the fiber was originally and others will be a blend of anywhere between white and a deep wine color. No segment of the textile will look precisely like another. The deep wine color speaks of maturity. Yet, the glints of white and shades of pink serve to soften what could be taken as a dire perspective. Sustainability truly is a serious topic, but not one without hope for the future.

The inspiration that brought Fiber to Attire into being began with the fiber itself. It is a 50/50 blend of natural Polwarth wool with eucalyptus cellulose fiber infused with pearl powder in the

manufacturing process. The pearl powder was added to the viscose fiber through high technology and binds onto the fiber surfaces during the hardening stage of the closed-loop process. As a result, the fiber contains nutrients, amino acids and trace elements that are permanently fused into the fiber. Creating a fiber with an ultraviolet protective factor higher than 30, antibacterial and cooling properties. It also possesses a high level of breathability and opalescent luster. By blending this outstanding fiber with wool, it adds the characteristics of strength and great moisture absorption to its repertoire. Furthermore, this fiber blend is entirely natural and biodegradable. To prepare the pearly Polwarth for the process of being woven into cloth, it was spun on a spinning wheel into two ply yarn. The finished worsted weight yarn was wound into a skein, washed to set the twist, pre-soaked for dyeing, then sprinkle dyed. After the yarn was thoroughly rinsed and dried, it was wound into center pull yarn cakes to be ready for weaving. This handspun yarn was used as the weft on the loom. For the warp, silk 20/2 yarn was purchased and dyed using the same methods as the weft yarn. One of the challenging processes was to learn how to warp a rigid heddle loom with a larger quantity in mind than attempted previously. For ease of direct warping, the yardage was broken into two segments of sixteen feet of warp each. Together both segments resulted in eight yards of fabric in a plain weave at 25" wide. The textile was washed and dried before utilizing a printed pattern to sew the piece. The combination of lace weight yarn for the warp and worsted for the weft created a textile with more stretch than expected. Which, in tandem with the final garment's weight of five pounds, created an interesting fit issue where the handwoven layer of fabric draped lower than the linen lining, requiring adjustment.

Each step taken towards sustainability makes a difference. There is a multitude of non-sustainably made products already manufactured. Though their production may not halt for some time, it is possible to use those products sustainably and not create more waste than necessary by discarding them. Through producing quality textiles by hand in countries such as the United States that have fallen away from the textile art and making use of a pattern and materials to create an entirely unique textile and design, the Fiber to Attire project brings sustainability one step closer to reality. Perhaps a small step in the wide scope of the world, but an important one nonetheless.

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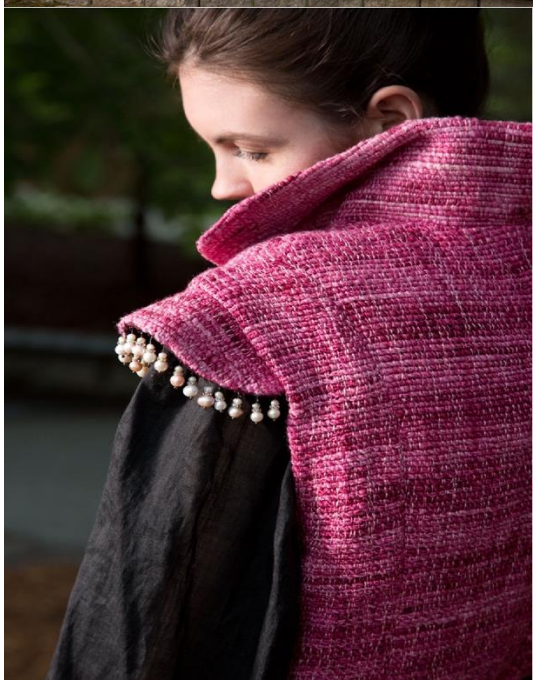

Forest Seasons

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Key Words: Serti, Batik, Surface Design, Non-Apparel

Forest Seasons was commissioned as an art cloth to cover a plinth and serve as the base of a display of a bird's nest with stone eggs. Attendees at a community event were invited to take the stone eggs as a gift on leaving a party celebrating the advent of spring. The goal of the design was to create a forest of trees to hold the nest aloft, with the seasons of the year flowing around the trees painted onto the 45"x45" 8mm habutoi silk. The choice of a table covering, rather than a wall piece, was partly based on the ease of laundering the colorfast fabric, something more challenging with other types of art cloth. The large size of the piece required painting to be conducted in phases, with careful planning so that the resist and then the dye could dry completely before the silk was repositioned in the painting frame. Because the smooth, translucent effect of the dye is spoiled if wet dye is added back into dry dye, the design had to include resist lines that were intended to allow continuation of painting on another day without creating obvious blocks of color. The style of the trees were practiced on smaller sampler pieces so that they could be painted free-hand using a specialty silk painting tool called an Airpen. The large size of the piece required painting to be conducted in phases, with careful planning so that the resist and then the dye could dry completely before the silk was repositioned in the painting frame. Because the smooth, translucent effect of the dye is spoiled if wet dye is added back into dry dye, the design had to include resist lines that were intended to allow continuation of painting on another day without creating obvious blocks of color.

The rice-based resist used to paint the trees was tinted with black dye that was diluted as the "year" progressed to give the trees standing in the winter and early spring seasons a more silvered appearance, resembling the fading of bark. The Jacquard brand Red Label Dyes are specifically designed for use with silk painting and produce brilliant, transparent colors that are fixed by steaming (Teli 2015), which reduces water pollution during finishing. The edges of the silk are hand-rolled following steaming using silk thread. Waiting to hem until after painting and steaming allows the dye to fully penetrate the edges, which can sometime be problematic when the edges are pre-hemmed.

According to oral histories of the craft, silk painting came to Europe in its current form via Russia to Paris. The name "Serti" is supposedly related to the French word for fence, indicating the method of containing liquid dye using a barrier created by a thin layer of gutta percha (Network 2013). The advent of the liquid rubber from the gutta percha tree stimulated a wide

variety of craft based uses (Seogiarty 2017). While Batik typically uses wax, gutta based methods have the advantage of producing stable resists that are flexible through manipulation and also dramatically increase safety by removing the use of heaters to keep the wax liquid during application. One downside of the gutta method is that the gutta is difficult to remove from the fabric, meaning it is often left on the fabric and even after dry cleaning, can leave a residue that impacts the hand. However, designers have seen this limitation as a challenge, and often the use of black dye incorporated into the gutta means that the resist lines can be incorporated as part of the design in a more significant way. Surface designers who come from a painting tradition where these types of lines are minimized or covered completely have found the dark lines stimulating (Ritzel 2015).

The more recent availability of well formulated resist alternatives to latex based gutta have stimulated many silk painters to use cellulose-based resists that can be described as rice paste. Research into the history batik in Indonesia shows that rice pulp starch was used as a resist for batik long before the use of wax (Seogiarty 2017). A return to the use of rice-paste gives surface designers additional choices in the impact of their "fences". The rice pastes are water-soluble, so they can be thinned with water as opposed to solvents, be removed more easily if mistakes occur and more importantly, be tinted with the same dyes used for the rest of the painting (Moyer, 1993). Gutta, now made from latex, can be purchased in shades such as black or gold, but may not be the right medium to make design-based changes during painting. Additionally, the ecological impact of cellulose-based resists is minimal compared with the production and disposal of latex-based materials.

The resulting design is a unique piece that captures the feelings of optimism and enthusiasm felt in a forest that is continually progressing towards the next season, sheltering younger trees, and even a small natural fire that presages renewed fertility.

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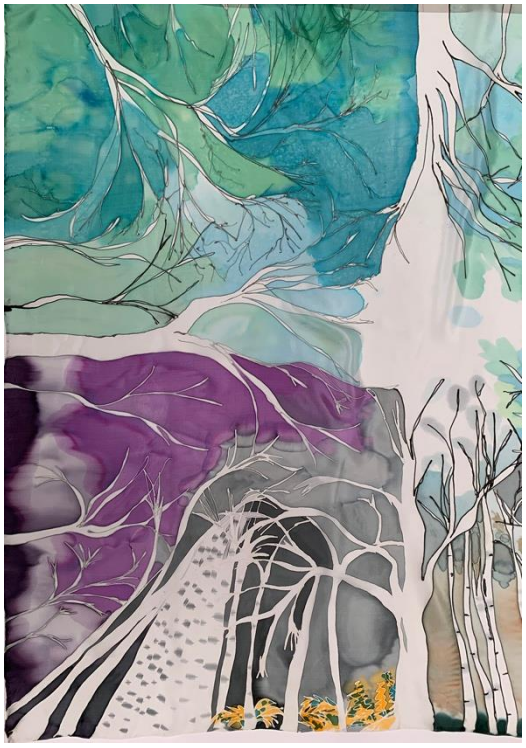
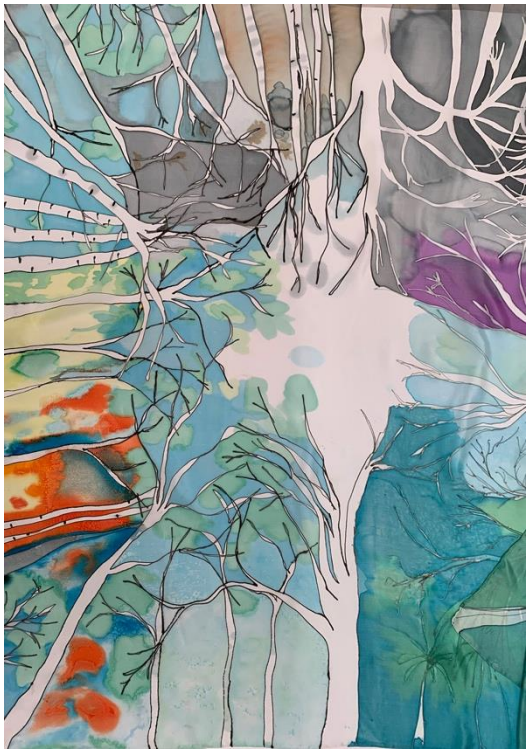


Heritage Oneshirt

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Key Words: Slow Fashion, Embroidery, Apparel, Norwegian

Slow Fashion is a parallel to the Slow Food movement, which developed in opposition to Fast Food (Clark, 2008). With the offshoring of apparel production to regions with low-cost labor, fashion supply chain does resemble the food supply chain. The fashion application of the Slow concept focuses on hand crafted garments that are closely connected to a local/regional supply chain, but not necessarily to a local fashion culture, unlike slow food. Fast fashion also spreads apparel culture in its easiest to manufacture form in ways that obliterate the local fashion culture, replacing garment styles and textile construction preferences with a global spread of low-quality trend-based products. Each new "season", offered up by fast fashion or drop ship retailers once a week, is designed to create a "hunger" for the new that is similar to the hunger felt many times a day for food. Improving the quality of apparel is crucial for the switch from fast to slow fashion, since quality produces durability that makes a slow fashion item fit for long term use. However, the local supply chain connection and the resistance to trend driven decisions is another important part of slow fashion that can be assisted by reference to heritage fashion ways, in the same way that heritage food ways inform slow food adherents.

The Norwegian Bunad is a form of ethnic dress that was revived in Norway as part of an early 20th century movement situated within the preservation of handicrafts that support a regionally differentiated identity along with ethnic pride. According to Strand (2018), craft historian researchers such as Hulda Garborg (1903), worked to preserve photographic documentation of heritage dress that had already been produced in the late 19th century, along with the fragile samples of earlier garments that were serving as templates for the revival of the Bunad for both men and women. While anachronistic regional dress revival is not limited to Scandinavia, or even Europe, the formation of the Husflid (Handicrafts Guild) system to support handicraft education, to develop and enforce regional norms and to ensure the continued production of specific raw materials (e.g. linen and embroidery wool) through the power of centralized buying, gives Norway a continuity in the use and production of ethnic dress that is relevant for supporters of the slow fashion movement. Bunad is worn by a majority of the population beginning with important rites of passage such as confirmation in the Lutheran Church or graduation from high school (at least for a set of photos). Conversation with Norwegian wearers of Bunad reveal that they are satisfied to have a garment that is considered appropriate formal dress for almost every occasion, a true "little black dress". The styling of the garments typically allows for alteration rather than discard when life phase induced body changes expand waistlines or shorten spines. Subsequent generations of bunad makers and wearers are making adaptations in styling and materials that are serving to keep this fashion way "alive" rather than freezing it in time

The Heritage Oneshirt was developed as part of a larger slow fashion project called the Oneshirt Project. The purpose of the Oneshirt is to serve as a permanent garment style that can be easily handmade and that suits the particular needs of the wearer. Each wearer would have their own style of Oneshirt, but once the style is resolved, it can be the only style worn by the maker for the rest of their life. The first Oneshirt pattern, worn daily by the designer since late 2017, has proven satisfactory up to this date, with only minimal changes to the pattern to address fit. The Oneshirt design accommodates a wide variety of materials and fabrication methods (e.g. embroidery, quilting, surface design) but has proved most workable with woven fabrics. To create the Bunad inspired garment, the Oneshirt base pattern was adjusted by the addition of a back yoke with a pleat in the center point to the provide styling ease. The large, deep pockets for keys, wallet and phone, a central feature of the utility of the Oneshirt that eliminates the need for a purse in most instances, were retained, making the garment silhouette a hybrid of heritage and 21st century utility. The neckline was raised to support a flat collar.

The skjorte (shirt) that served as an inspiration for the Heritage Oneshirt, was found in the digital archives of the Øst-Telemark museum. While the designer is Norwegian American, the Ost Telemark, specifically the Melum parish, serves as the local source for a slow fashion project based on ethnic heritage, in the same way that an Italian American might research Tuscany and discover the food ways of their ancestors for slow food inspiration. Preserved garments that serve as inspiration for the work of the Husflid in Øst-Telemark can also assist designers outside the region through the power of digitization. The chosen Skjorte, has an embroidered collar, cuffs and front pieces that examination of many garments shows were intended to be detached and applied to other shirts if the fit or condition of the shirt made it unwearable. Linen and wool were purchased from the Husflid in Bergen to form the body of Heritage Oneshirt. The embroidery resembles needlepoint, but also uses Gobelin-type stitches around the filled areas.

The embroidered collar, cuff and panels were completed first, since they were the most time consuming. The production of a muslin in a cheerful but affordable cotton allowed for the refinement of the pattern without risking the ruin of the expensive linen purchased for the final product. The final product can be worn over a simple skirt or leggings for occasions where ethnic inflected dress is appropriate. The full Bunad for the Melum parish includes a shirt, skirt, vest, belt, apron, purse and silver closures and brooches. The Heritage Oneshirt can be placed comfortably under these items if their future purchase or production is desirable. The slight bulk at the hips created by the pockets will fit easily under the skirt.

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Join each other again

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Key Words: *circular economy, fashion design, recycle, reuse,*

Waste and pollution issue is serious problem in fashion industry, and we are seeking new philosophy through renewable fashion design with aesthetic meaning. Textile reuse and recycling can be a sustainable solution for reduction in solid waste in land fill, reducing the production of virgin materials and energy consumption and environmental footprint (Shirvanimoghaddam, Motamed, Ramakrishna and Naebe, 2020). Beyond environmental concerning, however, the fashion design should be satisfied with consumers' needs as aesthetical meaning for a long-term satisfaction as well. In these reasons, we developed eco-recycled mixed materials dress. The design value on the aesthetical meaning beyond just recycling materials. This aims zero waste and reuse of wasted materials with aesthetic meaning, diversity in our society. Wasted fabric and leather as of scratching and discoloring were rebirth through cutting and sewing with hand knitting. Knitting yarn was also reused from factory and another knitting design. Cutting, weaving, and sewing process show us the possibility of reunion of diversity in our society. Through the meaning-making process, we could reconsider vulnerable people how they are impactful in our society through caring and loving, and we promoted the possibilities of home economics as circular economy through fashion design.

We visited several factories to collect wasted fabric, leather, and yarn, after then, developed pattern to design a dress. After checking the available area to use, we cut fabric and leather to join them. Rectangle shapes from wasted leather and fabric swatches connected with knitting structure. Plain structured hand knitting from recycled yarn was used both sides-front and back. To show the diversity and connection, we arrayed the rectangle shapes with color and material variation, and then sewed them for the front side. The back side of the dress was used as mixed materials-leather and wool-blend fabric. In general, making clothes using recycled materials has limitations in some way. Through the production technique used to supplement this, it provides a unique aesthetic pleasure different from ordinary products in general. The story born in this design process has playfulness and scarcity that consumers can enjoy, and it becomes a factor that allows consumers to choose products. Therefore, using recycled materials is also useful as a methodology for designs that deviate from stereotypes. It is hoped that more diverse expression techniques and works will be announced in the future and the area will be expanded.

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Photos

Nautical Rescue

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Key Words: Zero-waste, Upcycled, T-shirt bag, No-sew

Millions of plastic water bottles in landfills cause environmental harm due to not biodegrading for approximately 1,000 years (Palliser, 2010). As such, plastic water bottles should be reused rather than discarded after a single use. Hence, a crossbody bag that can hold a reusable water bottle along with other personal items would help individuals carry and reutilize their water bottles hands-free rather than discarding plastic bottles prematurely in the environment. In addition, textiles (e.g., t-shirts) weighing over 15 million tons were discarded in a single year within the United States (Leblanc, 2019). Converting used t-shirts into crossbody bags can help diminish textile waste through the following techniques: zero-waste (Gam & Banning, 2020) and upcycling (Paras & Curteza, 2018). In an effort to reduce waste and educate on sustainable fashion, this no-sew zero-waste upcycled pattern converts one used t-shirt into four crossbody bags in ten steps. An optional eleventh step combines multiple bags into a multi-compartmental crossbody bag. Aesthetically this design is very innovative, practical, and eco-friendly. *Nautical Rescue* aesthetically references rescuing oceans from discarded textiles and water bottles. Visually, the used cotton t-shirt's high-contrast fabric with navy and white horizontal repetitive striped lines reenforces the nautical-inspired eco-friendly design. This research used zero-waste design to address a social concern by eliminating textile waste (Gam & Banning, 2020). Also, no-sew techniques (e.g., only cutting and tying) provide accessibility to individuals without sewing skills. Therefore, this hand-knotted fabric bag that carries reusable water bottles creates a cohesive statement: a purpose to repurpose, whether textiles or plastic bottles. This bag pattern combines three challenging techniques (zero-waste, upcycling, and no-sew) in one bag to address t-shirt textile waste. This design expands on Eike's (2020) no-sew t-shirt design.

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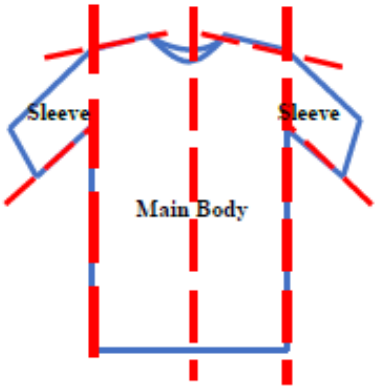
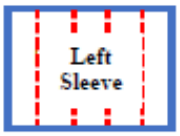
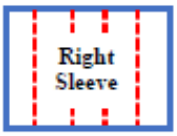
Figure 1.

No-Sew Zero-Waste Upcycled Crossbody Bag Instructions



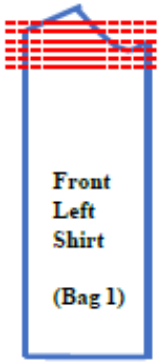


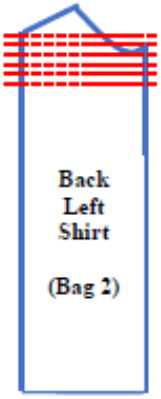


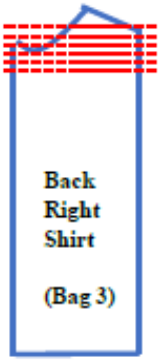
5. Cut the sleeves into long strips

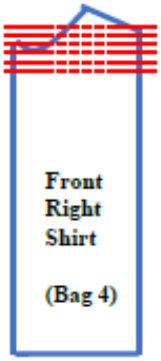
6. Cut the tops the main body of the t-shirt (just under the collar) into strips

- Materials needed: T-shirt and Scissors
- Directions (Makes upto 4 bags per t-shirt):
  1. Cut off the sleeves of the t-shirt
  2. Cut open the underarm sleeve seams
  3. Cut the main body of the t-shirt in half along the shoulder and side seams
  4. Cut the main body of the t-shirt in half

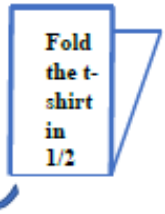




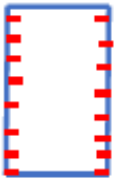




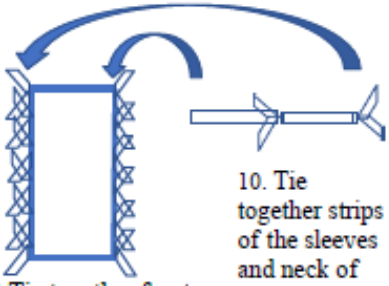
11. Optional: Overlap several bags on top of each other to tie the fringe at the sides of each bag together as well as the handles for a multi-compartmental bag.



7. Fold one of the four main body t-shirts in 1/2 lengthwise



8. Cut slits on both sides of the folded t-shirt



9. Tie together front and back slit pieces up the sides for double knotted fringe

10. Tie together strips of the sleeves and neck of the shirt to make strap and tie to fringe at top sides of bag

Re-Seen

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Keywords: Repurposing, Sustainability, Patchwork, Social

Contextual Review: *Re-Seen* was inspired by the painting "Surrendering" by Patricia Hill (2010). Influence was drawn from those who have been forgotten or overlooked in society, labeled as 'invisible' persons, also referred to as *marginalized persons* (Saraswati & Shaw, 2021). Marginalized persons are often deconstructed by those in opposition to explain why they are not 'valued.' This deconstruction as visible in Hill's painting (Figure 1), was the leading focus to use second-hand garments in this design. The garments (five male business button-down shirts with convertible collars) were first deconstructed and then reconstructed into a thoughtful sustainable and socially-focused piece. The skirt portion of the design was created from fabric squares of the second-hand shirts using "disappearing four patch" piecing technique. For decades, quilters have used scraps from old fashions to create new functional quilts for their families. Designers from Calvin Klein to Dior have used vintage quilts and patchwork in high fashions (Bauck, 2018). Scholars, like quilters, have designed mindfully with the idea of creating sustainable apparel pieces using discarded fashions (Eike, 2019) or patchwork techniques (Haar, 2019; Mehta, 2018) and some send a social message through design (Avila, 2018). *Re-Seen* combines sustainable fashion approaches of re-using second-hand fashions employing quilt block pattern techniques while also serving as a conversation catalyst to discuss marginalized 'invisible' persons. *Re-Seen* connects directly to the themes of Sustainability, Civil and Human Rights, Human Impact to align with the 2022 IFHE Congress.

Figure 1 Surrending by Patricia

Concept: This design utilizes second-hand polyester-cotton men's dress shirts to create a blouse and skirt using quilt piecing techniques. The blouse portion of the design is created from three men's business shirts: two solid-blue shirts and one pink with blue pinstripes, and added strips from the remaining two shirts. Using quilting techniques with sustainable fashion principles to create new functional objects, the skirt is composed of 26 quilt blocks using fabric from all five second-hand shirts.

Aesthetic Properties and Visual Impact: The design reflects the struggles of invisible persons through the aesthetic principles of rhythm, balance, and lines. Contrasting line types created interest: curved lines of the center circle medallion, vertical lines of the deconstructed strips hanging off the circle, and the additional angles of the "disappearing four patch" (Teresa DownUnder, 2018) blocks on the skirt. The principle of asymmetrical balance was explored through the extended right-side length of the blouse with the dangling strips of the deconstructed part of the circle. The asymmetry of the blouse reflects the irregularity of not fitting into the mold constructed by society. The rhythm was created through the use of multiple triangles on the front of the blouse. The 'disappearing 4-patch' quilt block was chosen for its name and to highlight that those who feel invisible are not and even the simplest of techniques can make a powerful impact. The center medallion or the heart of the blouse is half woven and is half unwoven representing the loss of self and incompleteness felt by not belonging, either by not starting to belong or being broken down by words and actions of others.

Process, Technique, Execution, and Cohesion: When creating a garment aimed to spark discussion connected to a social issue, special mindfulness was given to each design decision to create a cohesive concept of work. The asymmetric blouse has front and back waist darts plus back shoulder darts for proper fit. The blouse is held closed with five-button closures designed from collar tabs and buttons of second-hand shirt creating a large zigzag closure pattern. The right side is completely woven with one set of strips at 45-degree down angle from right to left and the second set woven vertically. The left side has one set of strips at 45-degree down angle left to right with a second set unwoven, hanging free. The gathered Dirndl skirt was created from 104 individual squares assembled by a multiple-step process into 26 "disappearing 4-patch" quilt blocks. All blocks are set on point without additional seam lines, making the patchwork quilt the actual skirt and not a background from which the skirt pieces are cut.

Design Contribution, Originality, and Innovation: This design contributes new ways to use existing garment elements of reused apparel goods. As recommended by Eike (2019), reusing of existing components, such as buttons and buttonholes, when repurposing apparel can add to the efficiency of time during the reconstruction phase. Therefore, *Re-Seen* utilized the pre-existing buttons and buttonholes of the second-hand shirts to create the center closure. Research of past repurposed creative scholarship has shown that collars and cuffs are often too small for new pattern pieces to be cut and thus unused, however, *Re-Seen*, incorporated them in a new and useful way that other sustainable fashion designers and scholars may consider in future repurposed creations. *Re-Seen* demonstrates how quilting techniques can be combined with clothing reuse to create a thought-provoking piece that stimulates decisions.

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Photos

Re-Surfaced Bauhaus on Canvas: Upcycled Wall Art

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Key Words: Repurposing, Wall Décor, Digital Textile Printing, Graphic Design

It is well documented that the textile industry is a major contributor to environmental harms, from the fiber, textile, and product manufacturing through consumer use and disposal. How consumers value a textile product has a great impact on its environmental impact than many realize. For example, if a consumer chooses to find a new owner for their unwanted item(s) rather than donating to a secondhand retailer or tossing directly into the refuse bin, he/she is choosing to place a high value on their product to ensure the continuation of its life. Some individuals choose to engage in textile/apparel sustainable consumer practices such as swapping, mending, repurposing/redesigning, and others, that extend the life and use of their owned goods (Fletcher, 2016). The focus of this wall décor design scholarship, *Re-Surfaced Bauhaus,* aligns with repurposing which is a process that utilizes discarded textiles to create new/renewed soft good products (Eike, et al., 2020), as it has been suggested as one solution to combat textile overconsumption, and landfilled textile waste (Fletcher, 2008; Young et al., 2004). This surface design-focused wall art pulls influence from the Bauhaus art movement, which can be described as a combination of the Arts and Crafts movement with modernism (Lupton, 2019).

The purpose of *Re-Surfaced Bauhaus* was to look to discarded textiles as a resource for adding three-dimensional interest to a Bauhaus-inspired digitally printed graphic for wall art décor installation. The challenge was to employ a variety of surface design techniques, using the additive repurposing approach, to merge the craft of making with modern digital textile printworks. The output of this scholarship aimed to serve as a conversation piece around responsible textile production and consumption that can also be an example of a creative application of technology, surface design, and sustainability. Through this purpose and challenge, *Re-Surfaced Bauhaus,* aligns with the IFHE Congress theme, *Soaring toward Sustainable* Development, particularly associating with Sustainability and Systemic Action – Education.

After the Bauhaus-inspired graphic was designed and printed onto 100% cotton canvas fabric using a digital textile printer, a variety of surface design techniques were explored for adding additional interest and three-dimensionality to the piece of work. The repurposing process, specifically level 3: additive repurposing, was selected as the guiding design framework to carry out application of the different surface design techniques. Additive repurposing can be described as the design method of piecing together small textiles of varying shapes and sizes to create a larger textile for product development (Eike, et al., 2020). In *Re-Surfaced Bauhaus,* using

discarded textiles from a university sewing production studio textile collection bin allowed for the upcycling of these once-destined-for-landfill small scraps of materials to be repurposed through surface design application.

The conceptual design direction for *Re-Surfaced Bauhaus* is an interesting wall art decoration that utilizes discarded textiles to give three-dimension to a graphic artwork. The complexity and variety of the surface design techniques compliment the original Bauhaus-inspired lines and shape that make up the graphic base of the wall décor. Balanced composition of the abstract design paired with complimentary surface techniques further emphasis the art movement of modernism and craft. Selective textile scraps, in a variety of fiber contents, fabrication structures, and weights, executed the surface design techniques. These techniques were: reverse applique, circular 3D stuffing, directional stitching of fabric strips, strip fabric weaving, layering of select textile scraps, yarn tufting, shaped scraps applied to surface, miniature darting, and satin-stitch embroidery. Additional hand embroidery stitches were used to complete the overall aesthetic.

From a scholarly standpoint, *Re-Surfaced Bauhaus* continues to build upon other repurposing design work of the lead author while expanding sustainable design scholarship to include creative surface design technique application. In addition to continued contribution to sustainability-focused design scholarship, the lead author is also expanding work to include home décor, as executed through this piece of thought-provoking wall art. The research context of this creative scholarly work, design purpose and challenge, repurposing process and surface design techniques employed through upcycling discarded textiles, were realized through a high-quality textile and design hanging wall art product. Viewers of *Re-Surfaced Bauhaus* can easily identify the Bauhaus art movement inspiration in the graphic foundation, while appreciating the handcraft surface design applications and the skills required to carry out the novel wall art.

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Rock Finder: Equity and Sustainability for Preschool Girls

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Key Words: girls, functional, pockets, gender equity, sustainability

Girls experience inequality starting at birth by just being born into a society that values boys more (Babcock & Laschever, 2003). Societal institutions including the apparel industry continually reinforce this despite consumer frustration (Robinson, 2018). To move toward gender equality, it is important to identify the ways in which retail clothing assortments available for purchase for children perpetuate inequality between girls and boys. Additionally, in this effort for apparel equity we should also consider the sustainability of the garments made for children as what these children wear now will have lasting effects on the environment of their future. Little published research has focused on the clothing needs of children (e.g. De Klerk & Tselepis, 2007), with even fewer studies considering preschool-aged children (e.g. Copeland et al.2009). Existing creative scholarship exploring childrenswear has indicated that girls' garments lack functional design characteristics, specifically regarding pockets and freedom of movement (Martindale, 2019). Additionally, it has been indicated that self-help characteristics such as elastic waist aid in donning and doffing (Stanley & McKinney, 2017). Therefore, the purpose of this design ensemble is to create empowering playwear for preschool aged girls that provides functional features that address the needs of their physical activities and accommodates their skill level in a sustainable way that will not negatively impact their future.

The preschool years of children's lives are a time of rapid development: physically and mentally. Children aged 3 to 5 live very active lifestyles and are working to meet physical milestones (U.S. Department of Health and Human Services, 2018). Participating in these physical activities can impact a child's emotional and physical well-being long beyond these developmental years (Truelove, Vanderloo, & Tucker, 2017). Clothing for preschool-aged children (sizes 3/4-6x/7) should be designed with comfort as a priority. This includes good body fit and appropriate proportions for ease in movement (Joseph-Armstrong, 2010). It is important to consider that all children want to carry items with them; therefore, pockets large enough to hold small toys are a necessity (Robinson, 2018). Garments for preschoolers should also be made out of durable fabrics that are easy to launder as well as easy to get on and off.

This ensemble is an application of a larger forthcoming study of 901 childrenswear pants from four major childrenswear retailers that revealed significant functional design inequality in clothing designed for girls' and boys'. This study revealed a gender disparity in several categories with this design focusing on: ability to carry items (pockets), short inseam length, ease in don and doffing, durability, and ease of care. Additionally, it was found that girls clothing was less sustainable having higher percentages of plastic sequins and other ornamental characteristics.

Drawing from the inequity found within childrenswear pant assortments *a* user-centered design approach (Watkins & Dunn, 2015) was used. As the designer worked through the stages of user-centered design, careful attention was paid to ensure the garment could be used by children of varying fine motor skill development and abilities. In addition to the study finding, feedback from preschool girls and their parents along with preschool play observations determined the garment design. From this the following

garment goal were determined: a) easy to don and doff, b) spacious pockets, c) freedom of movement, d) leg protection, e) durable, and f) easy of care. Ease in donning and doffing was met by the pull-on nature of the shirt and overalls, which featured an elastic waist and elastic section on the front of the shoulder straps that helps to keep the garment securely in place replacing closures that can be hard for small hands. The five pockets included two easy-to-access deep front pockets with curved openings and bellows and two back patch pockets ensured the wearer's capacity to carry items. An additional hidden security pocket was added in the seam of the overalls bib. Freedom in movement was met through the knit jersey t-shirt, and generous ease in the legs of the overalls. A 5" long inseam ensured legs were protected during play. Durability and ease of care were achieved by using cotton twill fabric along with jersey knit fabrics that are easy to wash and treat for stains. Several prototypes were tested with a four-year-old, and her feedback on fit and function during play was incorporated into the final design. She was delighted that the final garment was "cute" , had "big pockets" and was "really easy to put on." In order to insure the ensemble was sustainable digital textile printing was chosen to decorate the overall instead of less sustainable appliques and sequins. The overall print was created using images of rocks collected by the designers' children inspired by many young girls sharing that they collected rocks and wanted to carry them in their pockets. Both the fabric for the overalls and the t-shirt are 100% cotton with the t-shirts geometric color blocking mimicking the edges of the rocks in the overalls fabric print. The ensemble is durable enough to be passed down and worn by many children and is biodegradable with the removal of the velcro from the hidden pocket and elastic.

This design extends the dismal literature and creative scholarship on childrenswear by presenting an example of how user centered design can be used to create more equitable and sustainable clothing for girls. Rock Finder addresses what is missing in retail assortments today by providing an example of clothing that accommodates girls' physical activity needs through the inclusion of functional design characteristics that are equivalent to that already being granted to boys. When girls are equipped with clothing that allows them to be equally independent and prepared to fully engage in play, their quality of life is improved and gender equality is advanced.

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Rose Window of the Notre Dame de Paris

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Key Words: Upcycling, laser cutting, rose window patterns, vanishing lapel

The goal of this design project was to explore bridging apparel design, architecture, and upcycling. The concept was inspired by the aesthetic of the rose window on the Notre Dame de Paris. Three questions were raised during the design process: (a) how to appreciate the aesthetics of the rose window and the construction of the Notre Dame Cathedral through a piece of wearable art? (b) how to apply the sustainable design concept to a wearable art design?

Notre Dame de Paris, often referred to as Notre Dame, is a cathedral initially started in 1163 and completed in 1345. The stained glass rose windows above the gates and the arched flying buttress supporting the exterior walls of Notre Dame are two of the most important symbolic structures of Gothic architecture (Erlande-Brandenburg, 1997; Dow, 1957). This design is a part of a collection focusing on the aesthetics and construction of the architecture of Notre Dame. To promote environmental awareness by reducing waste, the dress was made with three used suede men's jackets and six men's neckties using laser cutting and engraving technologies. The silhouette of the dress was inspired by the *Pointed Arch* in the ribs of the Notre Dame cathedral. The back opening, the front and back seams that connect the fitted skirt and mermaid skirt, and the seams that connect central panels and side panels of the skirt resemble the arched shape of the gates of the cathedral. The purpose of creating the vanishing lapel (Nakamichi, 2011, p. 87) not only minimized the cutting and sewing thread wastes, but also represented the drapery folds of the carved portal and three-dimensional sculptures around the cathedral. The dress was draped onto a size 8 dress form, and the garment flat patterns were digitized into the Lectra Modaris Classic 2D V8R2 and then modified for accuracy for laser cutting (see Figure 1). The garment pieces of the deconstructed jackets and neck ties were also digitized into the Modaris. Both Modaris files were converted into Adobe Illustrator. In order to maximize the usage of the recycled clothing materials and arrange the placement of each pattern, the new dress patterns were fitted into the digitized original garment patterns.

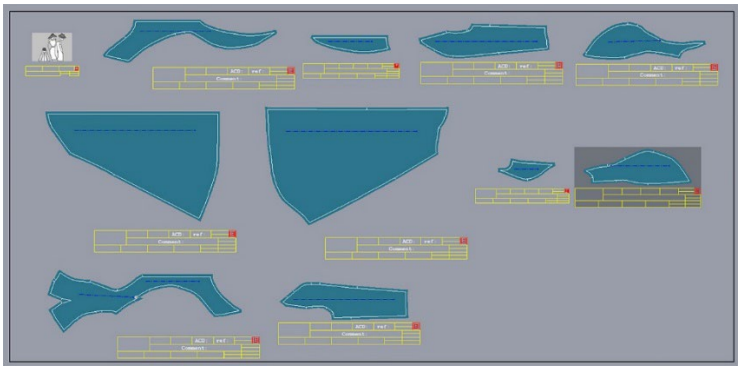

Figure 1. Lectra Modaris Patterns

The laser cutting motifs adopted the pattern of the rose window at the southern transept extension of the

cathedral designed by Jean de Chelles shortly before his death in 1258 (Erlande-Brandenburg, 1997) (see Figure 2). The recycled light brown jacket was used as the center panels to contrast the black sleeves and side hip panels. The curve around the waist and inverted trapezoidal panel were constructed to emphasize the slim curve of the body. The laser cutting motif was created in Adobe Illustrator and then engineered onto the sleeves, side hip panels, and front and back mermaid skirt panels (see Figure 3). The garment panels were laser cut using Trotec Speedy 400 laser cutter with 60% speed, 100% power, and 500 PPI. Four red floral neck ties were deconstructed and laser cut into the side hip panels. Two layers of the side hip panels (black jacket and neck tie) were stuck by two-sided fusible bond stabilizer. The contrast of the red tone floral prints with the black borders mimics the visual appeal of the stained glass rose window from inside of the cathedral. The neckline, edge of the back opening, sleeves, and skirt hems were bound by ½" binding made out of two men's neck ties.

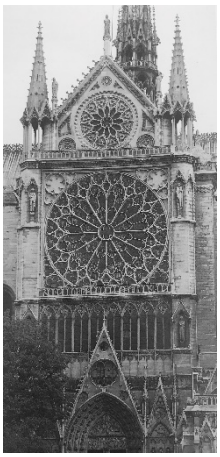

Figure 2. The southern transept extension of the cathedral (Erlande-Brandenburg, 1997, p. 161).

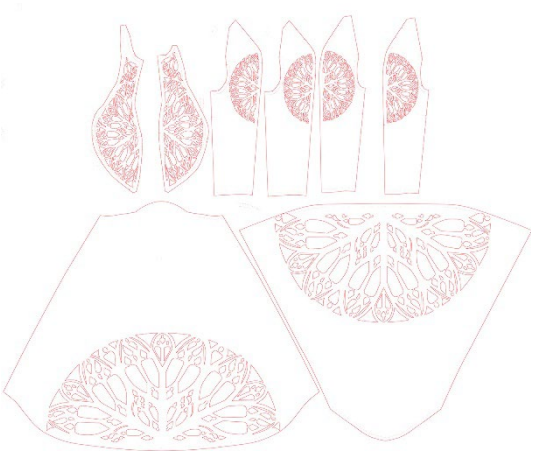

Figure 3. Laser cutting patterns in Adobe Illustrator.

This design integrated laser cutting beams and digital pattern making in the design process. It provides apparel designers an alternative source of developing unique textiles and enables designers to create engineered patterns. The processes of sourcing the inspirations demonstrate an innovative way of incorporating historical and cultural affairs into wearable art design.

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Sawda: A Traditional Felt Saudi Abaya Made from Local Wool

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Key Words: Saudi wool - felt- eco-friendly- responsible production

Abstract

Sawda is a traditional felt Saudi abaya (ankle length outer garment) produced from an organic local sheep's wool to support sustainable fashion and responsible production. The fashion industry causes environmental harm in different ways. One of these environmental problems is related to overconsumption and waste. Therefore, past studies have suggested reducing the consumption of non-renewable materials and textile disposal (Cao et al., 2014; Morelli, 2011; Watson et al., 2017; Weber et al., 2017). However, not all renewable materials are produced with consideration of sustainable practices. Although, the sheep's wool fiber is characterized as a renewable material, the chemical treatments used during wool production may cause environmental hazards (Hassan & Shao, 2016). Moreover, the wool in Saudi Arabia is under-exploited and the lamb consumption is increasing the wool waste in landfills (Al-Shihi, 2015). Thus, this garment was made from sustainable 100% natural and renewable materials as an attempt to improve on both concerns. The idea of the design was inspired by the nature of *Sawda* Mountain, which is the highest peak located in the southwestern region of Saudi Arabia. Because of the lack of women's outer garment that suitable for cold weather and appropriate for Saudi culture, this abaya is offering Saudi women an eco-friendly, distinctive, traditional, and socially accepted outer garment (cf. Kim et al., 2012).

The main challenge of this design was to create stitch-free felt pattern made from chemical free 100% natural local wool. The wool of local breeds *Al-Nuaimi* sheep was selected to make the abaya design. The wool was cleaned using organic soap, and dyed using natural dyes (i.e., turmeric, henna, roselle, and natural green food coloring). The following steps summarize the construction of this project: (1) soaking the wool in warm water mixed with a dye stabilizer (natural white vinegar), then placed in four different natural dyes, (2) laying out the wool fibers on the abaya pattern, (3) covering the wool with mesh fabric and sprayed with soapy water, (4) starting the rolling process until a solid single piece of felt is created, (5) removing the pattern and rinsing the wool felt, (6) drying the abaya, and (7) applying the felt buttons and needle felting was used to highlight the edge of the collar.

This design project contributes to sustainable consumption and production methods by using the felt techniques, and sustainable practice. *Sawda* was created from organic local wool,

which makes it recyclable, high-quality, and a long-lasting product. This design provides an application of using biobased materials and the under-exploited local resource to help the fashion industry become less dependent on non-renewable fiber sources and reduce its environmental impact.

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Photos

'Skeletons' – No bones about it!

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Key Words: Leaf Skeleton, Flowers, Seeds, Garment, Jewelry

Abstract
Fashion designers have long used the traditional technique of embellishments to create unusual surfaces and to amplify designs. More recently designers have broken new ground by introducing uncommon materials developed by innovating production processes and finished materials to create a new generation of natural fabrics. Leaf skeletonizing is a process that occurs spontaneously in nature. By eating up chlorophyll from leaves, larvae and insects, leave apparent their complex, fascinating venations. It is not unusual to come across insect-skeletonized leaves when you walk under trees in woods or even in your garden. The project presents a collection of fashionable wear using such natural materials.

The artwork presents 'A TREATISE' on the art of producing skeleton leaves - made by removing the leaf tissue from varieties of leaves without damaging the intricately framed veins. These dead leaves have a lace-like appearance. The leaves are amalgamated with natural flowers preserved for a vibrant colorful mood. Flowers **'dead or alive'** are conserved for their color and amalgamated with the skeleton leaves, add on as a new source of fashion material to make their own statement.

Leaves from the Sacred Fig tree (Ficus religiosa) as it is worshiped and seen around Hindu temples are used. These delicate leaf membranes are used as a collage for embellishing garments and creating jewelry. They are dyed and combined with Job's Tears seeds for a textured effect. The creation of garments embellished with these natural resources adds to the uniqueness of this collection. It attests techniques involved in flower preservation and making of leaf skeleton. It shows how simple ecofriendly processes such as retting the leaves can be used to recover the skeleton. The dying of the leaf skeletons, the use of the Job's Tears beads and the color preservation techniques of natural flowers, introduce new ecofriendly procedures and resources to create interesting, glamourous looks.

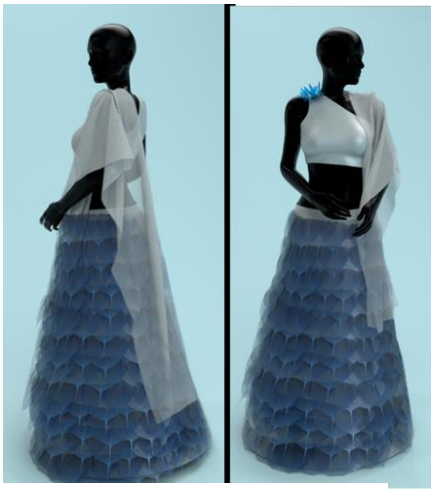

Figure 1. Lehenga Prototype

Prototypes of an Indian outfit 'Lehenga' (figure 1) and a 'Chotronette (figure 2) styled dress', embellished with skeletonized leaves and preserved fresh flower adorn the ensemble. The fishnet tights and accessories add interest to this look. The fossilized leaf skeleton is sculptured into trendy fashion jewelry and combined with preserved flowers to create a soft serene representation of eternal life. Reviving the old art and extending its limits to many kinds of leaves these filigree textures enhance the spineless charm for a fragile fashionable look.

Figure 2. Chotronette Prototype

Chotronetta

Lehenga

Mood/Inspiration Board

Accessories

Supporting Responsible Apparel Consumption through Design: Integrating Multiple Aspects of Consumer-Perceived Quality to Promote Long-Term Apparel Use

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Key Words: responsible production, apparel quality, color, floral, well-being

Contextual Review and Concept. Consumers are more likely to use clothing for a long time that they perceive as high quality (Aakko & Niinimäki, 2022). Clothes with a longer lifespan are more sustainable (Gwilt, 2013). This creative scholarship aimed to incorporate multiple consumer-perceived quality aspects into an ensemble to promote long-term apparel use. Aakko and Niinimäki (2021) found that consumer perception of quality is related to not only materials, construction, durability, functionality, performance, and ease of care but also color and "aesthetic experience."

Designers' choices of materials and construction methods impact quality factors of durability, function, performance, and ease of care (Gwilt, 2013). Thus, enhancing garment quality through materials and construction selections was a major goal. Another goal was to design garments that could create multiple outfits, thereby increasing their usefulness. "Aesthetic experience" is the feelings, emotions, and thoughts the garment evokes (Aakko & Niinimäki, 2022). Aakko and Niinimäki (2022) note that consumers judge garments perceived to "do something for me" as higher quality. Color creates emotional connections to products (Norman, 2007), and colors are associated with specific feelings. Textile motifs can also contribute to mood (Gordon, 2011). Floral motifs convey uplifting feelings associated with spring, beauty, and new life ("In Full Bloom," 2010). Norman (2007) notes that humans react positively to flowers associated with their symmetrical forms, bright colors, and sweet smells. Therefore, floral patterns and specific colors were incorporated into the garments to provide the user with positive feelings. This perceived benefit may promote the consumer's emotional connection and quality perception.

Home economists have shared how material selection and construction techniques can promote garment quality, usefulness, and longevity (e.g., Iowa Home Economics Association, 1972; Rochat, 1993). Creative scholars have investigated the use of color and flowers in the design. For example, Klaus (2018) explored how contrasting colors placed in proximity to each other can create illusions, and Ridgway (2017; 2018) explored how sound heard as color can be an inspiration for a textile print. Parsons and Morris (2019) explored laser cutting of floral motifs to create 3D effects. Lee, Hwang, and Baytar (2014) investigated strategically placed large-scale floral motifs to create optical illusions of the body shape. However, there is a knowledge gap regarding designing with specific colors and floral patterns to create emotional benefits. Further, creative scholars have not combined this aesthetic experience with material and construction choices to promote consumer quality perception, garment longevity, and, ultimately, more sustainable apparel consumption (Aakko & Niinimäki, 2021; Gwilt, 2013).

Visual Impact and Aesthetics. Colors were selected to evoke beneficial feelings to build the consumer's perception of quality. Bright pinks are associated with happiness and energy (Eiseman & Hickey, 1998). Green provides feelings of peace and calm (Feisner, 2014). White is connected with peacefulness and empowerment (Feisner, 2014). Yellow connotes cheerfulness, happiness, vitality, hope, and optimism (Feisner, 2014). Textiles in these colors were selected with a mix of motif scales to create visual interest, including a small-scale floral print, a medium-scale abstract floral, and a large-scale print. The author created the print by painting an original watercolor, scanning it, and digitally manipulating it into a textile print. The peony motif was selected for its association with prosperity (Field & Scoble, 2014), further

providing emotional benefits to the wearer. Repeated colors and floral motifs created harmony and unity among the garments while conveying the desired positive feelings.

Process, Technique, and Materials. Multiple aspects of quality were incorporated throughout the design process. Three coordinating garments were designed to be functional and multi-purpose. A "happi coat" (Slade, 2009) inspired jacket and two dresses with loose silhouettes were designed to ease movement and layering options for personal temperature management. Fullness in the overdress is controlled with vertical release tucks over the shoulders. The underdress is an elongated tank style. Dresses may be worn layered, separately, with, or without the jacket. Pattern pieces were flat-patterned.

Textiles were selected for performance, ease of care, and comfort. The peony pattern for the jacket was printed on a cotton and linen canvas, selected to provide body to the jacket shape and light warmth and breathability for the wearer. A cotton lawn was chosen for the overdress and a cotton and polyester burnout plisse for the underdress. A bright pink jersey knit was selected for the jacket's neck and arm bands. The jacket was sewn with flat-felled seams. The jacket's knit bands were interfaced for stability. The dresses were sewn with flat-felled or French seams. All hems are double-folded and edge-stitched. This construction provides durability, comfort, and a clean interior appearance. This work demonstrates how purposefully selected colors and motifs can create a beneficial "aesthetic experience" for the wearer. Integrated with quality construction methods the design achieves the purpose of creating a holistic impression of quality for consumers, promoting garment longevity and sustainability.

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Systematically Styled for Successful Sustainability – S^4

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Key Words: Sustainability, bridal, circular design, deconstruction

Abstract
Contextual Review & Concept: The fashion industry is looking for ways to reduce the negative impacts it has on the environment. Environmental damage is caused by the use of harmful dyes, reduced timelines of fashion cycles, and textile waste generation both pre- and post-consumption. What has generally been a linear model of production, consumption, and disposal, is now being investigated for ways to recreate the process. McDonough and Braungart (2002), introduced the cradle-to-cradle (C2C) method of reducing waste in product design. With this circular design model, garments are designed with the end of life in mind and purposefully designed in a way so that when the user/consumer no longer wants the product (i.e., waste), then the product (parts or as a whole) can serve as a resource for another purpose. Some scholars in use this circular, sustainable design approach to extend the life of the product, through design via repurposing (Eike et al., 2020), through design via size adaptability (McKinney & Wei, 2020), through modular design (Cao et al., 2014), and/or through design via disassembly (DfD) (Gam et al., 2011) which allows for separation of a garment's components for recycling of materials (at the fiber level) and reintroduction into a new product. In addition to utilizing circular designs concepts to extent product life, emotional value can also be a motivator for extension of the garment's life cycle and can be achieved though, "deeper person-product attachment through making the garment by oneself and through shared experiences, building a story captured within the made garment" (Walker and Chaplin, 1997, p. 4551). In the United States, wedding dresses are traditionally white in color and worn only once. As one of the most expensive garments many women ever purchase, not only can this gown purchase be a financial burden to the consumer, but it has a very short user-life and therefore, has the potential to be more environmentally sustainable, given modified design approaches.

One barrier to garment life extension, through repurposing, is a lack of consumer sewing skills and knowledge as well as accessibility to making tools and equipment. Instead, a product's designer can take a 'designing for disassembly' approach in the construction/manufacturing phase. Gam, et al., (2011), determined that six stiches per inch was the optimum sewing stitch length to maintain quality of the seam, while allowing for easy disassembly of the product. Using the DfD stitch parameters, consumers can easily and actively participate in sustainable fashion practices through the deconstruction and proper routing of garment components through recycling or reuse channels. Additionally, a simple aesthetic modification to extend a product's life is through coloration. Use of natural dyes to add color, or recolor, a product is an environmentally sustainable choice to keep damaging coloration chemicals out of soil and waterways. Suryawanshi, Naik, Kumar, and Gupta (2017), report that turmeric is a natural dye that can be used instead of the hazardous synthetic dye, eosin.

The purpose of this textiles and design project was to create a wedding dress that can be modified to extend the lifecycle of a wedding gown. Sustainable design methods included size-adjustability, modular design, design for disassembly, and natural dyeing. A small tie belt allows for size-modification. Dyeing instructions allow for color modification of the garment. When the garment life has ended, production

methods allow for easy deconstruction, leaving large pieces of fabric that could be used for other projects or routing through proper textile recycling streams.

Process, techniques, and materials: The final sustainable wedding gown was constructed of an off-white 100% polyester, silk-like drapery panel. The use of the polyester panel met several project goals including, extending the life of a synthetic-fiber product, lowering the initial cost of the materials by repurposing a used product, and creating a garment that is easily cared for by washing and hanging to dry. Vintage off-white sari silk ribbon was used to create a tie belt that provides versatility for the wearer. The available yardage was separated into 10 rectangular pieces, utilizing all of the available fabric, yet maintaining pattern pieces that could be reused after disassembly. Construction was performed on a Juki DDL-8700 with the stitch length of six stitches per inch, per DfD assembly guidelines. The sleeve and gathered sleeve are hemmed to allow for removal of each piece without needing fabric edge hemming.

Visual impact and aesthetics: Turmeric, used as a natural dye, produced a bright yellow color on the polyester fabric and a complementary yellow-gold on the silk. The tubular classic silhouette of the gown meets the design expectations of a traditional, minimalistic bride while also functioning as a semi-formal or business wear dress for other occasions.

Contribution to Textiles and Design: Addressing sustainability through design is a major challenge that the apparel industries faces. Many scholars are attempting to address some of these challenges through design and processes employed. This design provides an example of how an emotionally grounded product (i.e., a wedding gown) can have its lifespan lengthened through modular design, design for disassembly, and natural coloration. Additionally, modification instructions were developed to clearly communicate how to adjust the size and design of the garment – making the concept truly user-friendly. One limitation of this design is that it is not easily scalable for mass production.

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Front View, Full Length

Side View, Full Length, Short Sleeve

Short length, long sleeve, unbelted

Short length, long sleeve, belted

Transitions

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Key Words: Upcycled, Wedding Dress, Collaboration, Sustainability

Wedding dresses have incredible symbolism by representing a transition into a new marital life, and mark the beginning of the textile lifecycle journey from cradle (fiber), textile production, design, manufacturing, distribution, retail, and use phase to eventually the landfill grave (Payne, 2020). Bridal gowns are considered extremely wasteful apparel products in the extensive bridal industry due to their laborious manufacturing costs and limited usage before being discarded (Suhartini et al., 2020). Textiles including wedding attire discarded in 2018 contributed to 11.3 million tons of landfill textile waste (EPA, 2021). Fortunately, a substantial market estimated around $5 billion during 2020 arose from recycling textiles to create new products (IMARC, 2021). The recycling of expensive textiles such as wedding dresses into new products is a viable solution for these costly garments (Karkazian, 2016; Suhartini et al., 2020). Upcycled wedding attire provides a new life of reuse for existing textiles, which is symbolic of new phases and transitions in a human being's life from bride to mother and eventually grandmother. *Transitions* is a collaborative upcycled wedding gown design that had two design iterations each by different designers. The first design iteration, mother of the bride attire, is a peach garment that speaks of the life transition from bride into motherhood. The second design iteration is a silver braided handbag for the grandmother of the bride. Each rebirth, new design, and transition in life brings about new beauty, meaning, and purpose both for the textile and the woman this textile represents. This design process applied the concept of transitioning products away from a singular pathway to the landfill, which is part of Cradle-to-Cradle Design (C2C; McDonough, & Braungart, 2002) in both aesthetic impact as well as reuse of materials to make unique upcycled designs. This design was created by disassembling the original white wedding dress. Then, designer 1 dyed the fabric using a combination of both a cinnamon orange and rusty red synthetic Jacquard dye prior to painting the fabric with India ink using a painter's brush. Afterwards, the satin fabric was given to designer 2 to assemble into a new garment. The disassembled dress pieces were then draped to create a 2-piece ensemble that utilized all the skirt pieces and back bow components from the original dress. The dress was then photographed and disassembled. Designer 1 then dyed the fabric a second time using hunter green and cobalt blue dye, resulting in a silver color. After dyeing the fabric, the two designers met to collaborate on the final design of a braided handbag. The large skirt pieces of dress fabric were cut into 8-inch strips of fabric that were sewn together to create tubes that were braided to be used as the handle and decorative details. The puff sleeves and the bow components from the original garment were used to create the exterior and lining of the encasement. The braids were inserted and sewn

between the lining and exterior and the side were then hand sewn together. Each design utilized approximately 75% of fabric from the original dress fabric.

Original wedding dress

Iteration 1 front

Iteration 1 back

This design applied concepts from Suhartini et al. (2020) by creating new various design iterations of a bridal gown while enhancing the attractiveness of the upcycled garment through the design element of color. This research uniquely extends upon previous research on upcycled wedding dresses (Karkazian, 2016; Suhartini et al., 2020) by going beyond the typical upcycling of numerous yards of wedding gown material into simply a revised bridal gown design. Furthermore, this research demonstrates how the original dress owner can appreciate their wedding garment beyond their special day through upcycling.

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Cultural Commodification: Versatility with Functional Combo from Yoruba Indigenous Textiles

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Keywords: Indigenous Textiles, Design Diversification, Versatility/Functionality, Commodification

Indigenous textiles technology of cloth dyeing has played significant roles in stabilizing the economy of many Yoruba families until it became saturated with heavy flooding of imported synthetic textiles which endangered their indigenous counterpart. Though weaving and dyeing crafts were been described by Akinbileje (2014) as closed door hereditary professions usually passed from generation to generation through informal apprenticeship, schools of thoughts including Awosika, (2016) and Obasanho, (2017) are of the opinion that urgent interventions need to be worked out to rekindle hope in the indigenous Primary Textile Sector (PTS). One of such interventions is the: '*2-Piece Tie/dye Long Skirt and Blouse'* developed from the adaptation innovation theory of Kirton (2009). The theory is concerned with the exhibition of differences in creativity and thinking styles of individuals with skills supported by appropriate styles, to successfully undertake innovations that meet people's aspirations and demands that cannot be met by traditional techniques for mass production and job creation among participants along the product's value chain.

The purpose of '*2-Piece Tie/dye Long Skirt and Blouse'* is uniquely was to introduce innovations that could make the indigenous textile industry develop beyond the limitation of manpower underutilization and underproduction by creating opportunity for up skilling for dyers, dressmakers, and textile merchants to boost their financial base through products' mass production according to Iweka, (2019).

'*2-Piece Tie/dye Long Skirt and Blouse'* is a mono-technique design in which 4 yards of 100 percent cotton white Voile material was used. The fabric was pre-treated by soaking overnight in water to dissolve all the starch/stiffening and glazing finishes that could interfere with dyeing/coloration. The fabric was made to undergo a pre shrinking process to ensure the style to be sewn from it maintains size and shape in use. The voile fabric was laid on a flat table and 'pleated into 1 inch width along the 4 yards length and tied at intervals of 2 feet apart'. Two different dye baths: each one containing the Sodium Hydrosulphite (Na2S2O4), Sodium Hydroxide (Naoh), and Sodium Chloride (NaCl) dissolved in water with Brown colour dye stuff in one and Army Green colour dye stuff in the other. The dye concentrates were each poured into separate plastic bottles with nozzles and applied into the designed fabric through the nozzles by alternating the colours at intervals of 12 inches apart allowing some infusion between the two colours of dye for a more aesthetic effect in the product. The design was allowed to hold for about 40 minutes in line with the findings of Shuaib and Awosika (2016), the strings were removed and fabric was spread out to oxygenate till the colours came out distinctively, rinsed to remove lose dyes and later, stiffened, dried, and ironed.

At the completion of the *Adire* production, the product was cut into the 2-piece outfit using a Size 12 body measurement of an adult female after sketching the desired style on a pad and cutting the pieces with the lining material. Sewing was done sectionally following the instructions from Awosika, (2008) and Nkeonye (2013). Each section was assembled: sleeve to armhole, bodice to 'Peplum waistline and final ironing was done. So was the skirt sections assembled and the zipper was fixed in place, band was fixed as appropriate and final ironing done.

Additional ornamentation with gem stones was applied on the surface of the *bodice* to complete and compliment the overall aesthetics as posited by *Okpu and Abimbola (2020).* Basically, indigenous knowledge involves sustained trainings in inherent skills as aptly said by Burak (2015) to make people economically able to sustain desirable livelihoods and living, because incrementally new products on consumers' acceptance in both formal and informal sectors would do a lot to boost scientific and technological needs as keys to African development and poverty eradication. The process of the '*2-Piece Tie/dye Long Skirt and Blouse'* would fast track desirable technological advancement, ensure self-reliance and help weavers, dressmakers and clothing merchants with capacity building above poverty line to attract foreign investors and grow the indigenous textile industry into a globally competitive endeavor if embraced.

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