Journal of
Design Studio
v:7 n:1 July 2025

An Investigation of How the Circular Economy's Upcycling, Repair, Reuse and Recycling Strategies Might Increase Resource Efficiency and Reduce Fabric Waste Generation in Nigeria

Ngozi Kesiah Okeke
Department of Fine and Applied Arts, Nnamdi Azikiwe University, Awka, Anambra State. Nigeria

Research Article / Received: December 9th 2024, Revised: April 21st 2025, Accepted: April 24th 2025
Refer: Okeke, N. K., (2025), An Investigation of How the Circular Economy's Upcycling, Repair, Reuse and Recycling Strategies Might Increase Resource Efficiency and Reduce Fabric Waste Generation in Nigeria, Journal of Design Studio, V.7 N.1, pp 107-124
N.K. Okeke ORCID 0009-0006-4019-5406, (nh.okeke@unizik.edu.ng)
DOI: 10.46474/jds.1596272 https://doi.org/10.46474/jds.1596272

Abstract: Growing fashion trends and the problems of massive waste generation, pollution, and the depletion of natural resources has led to an intense search for alternative ways to obtain raw materials for the production of textiles and other related products. In recent times sustainability have become the focus of attention due to the desire to reduce the use of natural resources and guarantee a healthier environment. Circular economy has appeared as a sustainable solution to this global economic, environmental, and social problem. Globally, the public and business sectors, as well as academia, are becoming more conscious of the circular economy. The circular economy presents a novel strategy aimed at altering our perspective on the creation and consumption of products and services. Nigerians haven't, however, fully benefited from the circular economy. The traditional textile industries operate in a linear fashion, extracting raw materials and using them to make cloth that is then discarded after a short period of time. This method is unsustainable since it produces a lot of garbage. Adoption of the circular economy offers a new model for keeping textile resources in use for as long as possible, resulting in a reduction of the quantity of textile waste generated. This is in response to resource depletion and the environmental pollution that arises from improper disposal of textile waste. The study used a mixed research strategy that included both exploratory and qualitative research. As a useful tool for moving towards a circular economy, the study aims to explore and encourage Nigerians to adopt reuse, repair, recycling and upcycling of textiles strategies. The aim was accomplished by reviewing existing practices on adoption of reuse, repair, upcycling and recycling of textile. Financial and environmental advantages of reusing, repairing, recycling and upcycling of textile were also examined. Waste fabric that was turned into a rope band used to conduct a hands-on investigation of upcycling and worn fabric was recycled into insulated pot holder. Visits was made to churches providing free worn fabric for reuse. Highlighted were the steps involved in weaving a table mat out of leftover fabric and the finished result, a tablemat. The study found that these tactics can be used by both individuals and cooperative organizations to address the issue of environmental pollution, save resources and money, particularly in current difficult economic climate, and provide income for young people without jobs.

Keywords: Circular economy, Reuse, Repair, Upcycling, Recycling, Fabric waste

1.0 Introduction

The aftereffects of industrial revolution and its production processes are problems such as, huge waste generation, environmental pollution, and a shortage of raw materials, particularly in the textile sector. The availability of inexpensive and more visible fast fashion products made it possible for people to purchase more clothing than they actually need, which are often thrown away after a short period of time generating waste. The textile sector is one of the biggest sources of environmental contamination. According to Swarna (2023) it emits 1.7 million tonnes of CO2 annually, equivalent to 10% of global greenhouse gas emissions, making it a major contributor to global warming. This has resulted in the quest for alternative ways of producing textiles that will reduce the quantity of waste generated as well as the consumption of natural resource. The circular economy has come to light as a viable answer to this global issue.

The circular economy is a system where materials never become waste and nature is regenerated. Products and materials are kept in circulation for as long as possible through processes like maintenance, reuse, refurbishment, remanufacture, recycling and composting (Ellen MacArthur Foundation) The traditional textile industry has a linear approach to its operations. This process is unsustainable since raw resources are taken and utilized to make cloth that is used and then thrown away after a short period of time, generating a great deal of waste. According to estimates, the rate at which natural resources are consumed is twice that of their production, and by 2050, it may triple, leading to unprecedented exploitation of natural resources with carbon footprints and water-related environmental effects (Aranda, Zuniga, & Rivas, 2023).

In light of resource depletion and the pollution caused by improper disposal of fabric waste, applying circular economy in fabric production provides a new model for the manufacturers and consumers of textiles to reduce the amount of textile waste produced by extending the life of resources. Additionally, it will support the preservation of our natural resources, provide jobs and economic success while fostering local and sustainable growth. In addition to environmental considerations, the circular economy also considers economic and social advantages (Aranda et al., 2023).

However, despite these advantages, the global economy in 2023 was estimated to be just 7.2% circular, with the linear economy model still dominating, (Bellini, Anderson, Klungseth, and Tadayon, 2024). Since clothing is one of the basic needs of man whose production processes and consumption generates a lot of waste that are not properly managed, it is expedient that more people get committed to implementing circular economy model for fabrics through simple do it yourself strategies. In the face of the current economic challenge facing the country, this solution could also bring sustainable growth.

One of the numerous ways circular economy models can be implemented is through reuse. Reuse is defined as when a different customer uses a discarded product that is still in good shape and can still perform its original function (Malooly and Daphne, 2023). Reuse strategy of the circular economy can be applicable in items such as furniture, electronics, books, fashion accessories such as handbags, jewelry among others. An excellent illustration of this, is Nigerian Okirika market where the buying and selling of second hand clothing, footwear, and bags are carried out. Clothing with classic styles and long lifespans when reused promotes less consumption, saving money and virgin resources. According to Delanoeije and Bachus (2020) reuse is seen as circular since it can remove products from the waste stream and save raw materials by replacing new ones.

Recycling is another way to embrace the circular economy paradigm. According to Jarvis (2023) there are two different types of recycling; open-loop recycling and close-loop recycling. Open- loop recycling is a type of recycling that takes one item or material and turn it into a different item or material. Jarvin (2023) maintained that it is a handy solution for keeping resources out of landfills, but it does not really reduce the demand for new virgin

resources for example, there will still be need to produce new plastic bottles to replace the ones recycled into a sweater. On the other hand, closed-loop recycling is a system that closes the loop on resources and actively reduce demand for new, virgin resources. For instance, when aluminum can, is recycled back into another aluminum can.

This cutting-edge method when applied on fabrics, reduces reliance on virgin resources by converting worn material into usable fibers that might be used to create brand-new clothing. In certain cases, recycled pallets made from post-consumer plastic bottles or other polyester items can be spun into fresh polyester fibers. In recent times, entrepreneurs in Nigeria have started solving the problem of waste pollution by recycling plastic bottles, aluminum cans, pure water sachet, nylon bag, tires among others into something similar or more valuable. For instance, Chaja Datti company in Abuja and Unizik Plastic Production Line.

Repurposing and upcycling are more ways to adopt the circular economy paradigm. This generally refers to the transformation of products or materials into new and value added products. When adopted on fabrics it could mean turning used or fabric waste into valuable items such as table mats, appliqued bags, using waste fabric to applique designs on new dress among others. For instance, Adejoke Lasisi a Nigerian entrepreneur is developing fashion products from pure water sachets and textile waste. These fashion products are 90% nylon and 10% textile material (Adeoyejo, 2021).

Repair or upgrading is another crucial circular economy tactic that is applicable on used items. This could be professional repair services or do-it-yourself repair. When there is still life left in a used product, repairing it, prolongs the product's lifespan rather than discarding it. By doing this, virgin resources are preserved, waste is decreased, the carbon footprint associated with processing virgin raw materials is reduced, and significant financial savings are also realized. Worldwide, a lot of work is being done to promote user participation in product lifespan extension techniques through corporate and governmental laws. In Nigeria repair or upgrading is mostly common with electronics materials. If it is properly applied to fabrics, it will help in reducing the quantity of used fabrics that is dumped after a short time.

The expansion of fabric fashion trends resulting in the construction of more clothes by dressmakers generates a lot of off cuts, when these cannot be put into further use disposing them becomes a challenge. In some cases, these fabric waste are disposed by dumping it in water ways or by burning. Either way, these methods of disposing fabric waste causes environmental pollution. The blocked drainage channels increase the occurrence of flooding during the rainy season as some of the fabrics are not biodegradable.

The aim of this study is to investigate and encourage the use of upcycling, repair, recycling and reuse techniques as a useful tool for the reduction of fabric waste, conservation of resource and the shift to a circular economy in Nigeria. The application of the strategies of reuse, recycling, upcycling, and repair of textiles in Nigeria will undoubtedly benefit the general populace. It would not only save money and lessen pollution in the environment, but it can also give the hundreds of thousands of young Nigerians without jobs a way to make a living. Existing literature on strategies of reuse, upcycling, recycling and repair will be examined. Interviews will also be conducted with field actors such as tailors, shoemakers and church groups promoting reuse of worn fabrics. The economic and environmental benefits of these circular economy strategies will be highlighted. The second part of the study will explore repair, recycling and upcycling strategies, showcasing works produced using these strategies to encourage designers and general public to adopt these strategy as a contribution to a sustainable environment in line with the twelfth Sustainable Development Goal; responsible consumption and production.

1.1 Statement of problem

Despite the increasing awareness being created around the world about adopting a more sustainable production and

consumption pattern, practical implementation of circular economy in Nigeria is still at its early stage (Ajibesin, 2023). With a number of people already tapping into the inherent opportunities of circular economy through recycling of plastic, polythene bags, metals and organic waste, but scarcely fabric waste. Chemical recycling of textiles is more complex process and the technology for doing this is currently not readily available, however, the mechanical recycling can be easily carried out by individuals. Likewise, the circular economy strategies of reuse, repair and upcycling. Yet, reuse, repair, recycling and upcycling of fabric waste, have not been given enough attention when it comes to circularity in Nigeria. With the growing fashion trend enhanced by the *aso- ebi* culture and consumer demand, fabric waste challenge is expected to build up. Scraps of cut-off fabrics are common sight in tailors' shops, and they are typically disposed of carelessly. Some people also dispose their used items which includes used fabrics in the gutters during the rain, blocking the drainage channel which often leads to flooding. According to Edom (2023) citing world bank, Nigeria generates 2.2 million tons of solid waste annually a substantial portion of which comprises of textiles. If reuse, repair, recycling and upcycling strategies of the circular economy is pushed in Nigeria, it could play a significant role in addressing the concern posed by the amount of fabric waste generated by fashion industry. These methods will lessen the negative environmental effects of inappropriate textile waste disposal. It will also minimize the impact of hazardous chemicals and waste water discharged into the environment during the production of new fabrics. It can also be a means of saving money particularly for low income earners.

1.2 Purpose of the study

The aim of the study is to investigate how reuse, repair, recycling and upcycling strategies of the circular economy can be employed to reduce the environmental impacts of fabric waste and increase resource efficiency in Nigeria. The aim was accomplished by achieving the following objectives:

1. Identifying the environmental harm caused by indiscriminate disposal of textile waste.
2. Practical exploration of reuse, repair, recycling and upcycling strategies enhancing resource efficiency and reducing waste generation.
3. Examining the environmental and economic benefits of implementing reuse, repair, recycling and upcycling strategies in promoting a circular economy

Research Questions

1. What are the environmental harms caused by indiscriminate disposal of textile waste?
2. In what ways can the strategies of upcycling, repair, recycling and reuse be used in reducing fabric waste?
3. What are the economic and ecological benefits of putting the circular economy's reuse, recycling, repair, and upcycling techniques into practice?

1.3 Significance of the Study

The achievement of this research has environmental, economic and social significance. On the environment it can minimize the quantity of fabric waste generated. Since textile production often involves utilization of harmful chemicals and processes that pollutes the environment, adoption of circular economy can reduce pollution and promote sustainable production process. By promoting reuse, repair, recycling and upcycling, the demand for new raw materials and production cost can be reduced, saving resource for the producer and the consumer. Circular economy strategies of reuse, repair, recycling and upcycling is an innovative business model that could create jobs for the teeming unemployed Nigerian youths. Access to affordable, repaired or upcycled textiles can benefit low-income communities in Nigeria. Above all, the twelfth Sustainable Development Goal, responsible consumption and production is promoted.

2.0 Literature Review

The literature review was carried out based on the following conceptual frameworks.

Circular Economy

European parliament (2023) described circular economy as a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible thereby reducing waste to a minimum. The study affirmed that reusing and recycling products would slow down use of natural resources, reduce landscape and habitat disruption as well as help to limit biodiversity loss.

In their study, Akanj, Amoah, Akpoveso, and Atanya (2023) used interviews to portray the lived experiences of nine entrepreneurs in Nigeria who were associated with CE. To describe the shift from government, waste management, and public rhetoric around CE to active enterprise development, a framework was created. According to the study, there is a greater understanding of circular processes in Europe, which is backed by well documented case studies of multinational firms. Additionally, it noted that the majority of CE initiatives occur in East Asia, North America, and Europe. Small-scale actors in CE are spearheading the shift towards a CE in order to realize the potential for revenue generating and job creation, in contrast to the Global South, which includes Africa

Consequently, the study proposes that macro – level catalysts such as government policies, infrastructure, and culture, along with micro-level catalysts such as passion, experience, and attitudes, will enable the shift from discussion to implementation of CE principles through business creation. Results from their interviews highlighted key challenges faced by CE enterprises in Nigeria and this includes lack of clarity about the concept of CE, lack of supportive policies and infrastructure, need for improved waste management culture, and difficulty accessing funding and materials. The study noted that micro-level actors, multinationals businesses, and nonprofit groups are the ones driving the shift to a full CE and recommended collaboration between government and private sector, for infrastructure improvements, incentives and education to further foster CE adoption in Nigeria.

Ajibesin (2023) Maintained that Nigeria generates 32,000,000 tonnes of waste annually, which makes it the 7th largest polluter in the world. Less than 30% of this waste is recycled while the rest ends up in landfills, sewers, beaches, and water bodies. According to Ajibesin (2023) waste management is a large business in other parts of the world, but Nigeria is still in its early stages. As a result, there is ample opportunity to explore various waste materials such as plastic, glass, textile, food, metal, and electronics, amongst others, which are in abundance. The study recommended that Nigeria circular economy road map must outline concrete actions that can accelerate the transition to a competitive circular economy in Nigeria. It should be a channel for sustainable development, economic growth, and environmental transformation, where the waste that originates from Nigeria and its recycled products can be used in Nigeria.

Nkanta (2024) in a recent study examined how Nigeria, as a nation, could benefit by shifting towards a circular economy rather than continuing with linear economic model. The study listed such ways as resource efficiency and reduced environmental impact, waste reduction and management, economic growth and job creation, innovation and technological advancement, reduction in greenhouse emissions, policy and institutional support for circular economy transition. However, the study noted that waste management is a major challenge in Nigeria, with urban areas generating significant amount. The study while maintaining that circular economy practices encourage rethinking waste as a resource, suggested that recycling initiatives could transform plastic waste into new products,

Nonetheless, the study observed that despite the prospects of circular economy in Nigeria there are barriers that are hindering its successful

implementation. These includes lack of infrastructure for waste collection, recycling, and processing, particularly in the rural arears. Low awareness among consumers and businesses regarding the benefits of circular economy practices. Limited access to financing for SMEs and startups looking to adopt circular models and Regulatory gaps and weak enforcement of environmental laws.

Reuse Strategy

The term "textile reuse" describes a variety of techniques for extending the useful life of textile items by giving them to new owners, either with or without previous alteration such as patching (Peters and Sandin, 2018). In another study, Sai,Quansah and Acquanye (2022) citing Delia states that reuse is to use an item again after it has been used and this includes conventional and unconventional reuse. Conventional reuse is where the item is used again for the same function. For instance, the use of fabrics bought from second hand market popularly known as Okirika in Nigeria. Unconventional reuse on the other hand is based on the concept where an item is used for a different function after it has performed its intended purpose of manufacture. For this study the focus is on conventional reuse of abandoned textile products that are still in good shape and capable of serving their original purpose by another user such as reusing second hand clothes.

There are different ways of getting used clothes to be reused such as trading, swapping, renting, borrowing, inheriting and donating. However, only when durable materials are used for initial manufacture can the circular economy's reuse approach be implemented. Okirika, the second-hand market in Nigeria, has been a booming industry that has given many Nigerians a source of income and allowed middle-class and lower-class people to get alternative clothing at a lower cost. However, these used clothes are imported from other nations, like the USA, China, Germany, and the UK. One starts to wonder what happens to textiles that are created in Nigeria and utilized there. Most often these are discarded in water ways or burnt, because people would rather buy foreign used clothes than Nigeria used clothes.

Haq and Rakifull Alam (2023) did a study on the application of circular economy principles in the apparel production process, which focuses on reusing pre-consumer waste for environmental and economic sustainability, after collecting and classifying the reusable cutting waste produced in a Bangladeshi factory, obtained 218.6 kg of surplus fabric, 212.3 kg of reusable cutting waste, and 210 reusable rejected cut panels that can be used to create about 2238 pieces of circular products. The method used in the study has shown the shortest circular economy loop, which includes the steps of collecting, sorting, redesigning, re-cutting, and sewing. The investigation concludes that in terms of concern for ecological sustainability and economic feasibility, the direct reutilization of pre-consumer waste cutting sections could prove more efficient than recycling, landfilling and incineration.

A social Enterprise promoting re-use and re-cycling of used textile known as Africa Collect Textiles (ACT), observed that the global textile and fashion industry extracts resources and inexpensive labour from some developing countries, and ships its fast fashion products to rather well off countries, which then often dump unwanted clothes as second –hand items onto other developing countries. “With little regard for societal and environmental consequences worldwide, such a linear model creates a tremendous loss of value, both ecologically and economically, estimated to more than USD 500billion every year due to underutilization of clothing and lack of recycling”. As a result, the (ACT) is out to make sure that circularity is not only put on reports, but practically implemented all over the world including Africa. To facilitate this, Africa Collect Textiles (ACT) aims to install collection and recycling models for used textiles in cities across Sub- Saharan Africa. Presently, Africa Collect Textiles (ACT) already has a collection, sorting and re/up-cycling system in Nairobi, Kenya.

Their work is centered on collecting unwanted clothes and other textiles and fashion items at churches, shopping malls, universities and schools. The collected items are subsequently sorted and then donated or resold or recycled or upcycled. Their success story in Kenya led to the feasibility study that was conducted in 2019/2020 in Lagos, Nigeria to answer the questions "In what way, if any, could the Act model be implemented in Lagos to allow for long-term, financial and technical feasibility of a local textile collection and recycling business? In conclusion, the study affirmed that an implementation of a textile collection and recycling scheme similar to the one implemented by ACT in Nairobi is feasible in Lagos. Nonetheless, the study suggested that the final business model for Lagos will need to deviate from the one in Nairobi. Because of the relative absence of wool and acrylic from clothing worn in Lagos, the inability of potential industry partners to recycle broken pieces into new fibres, and the potential of *aso ebi* culture as motor for unwanted but high quality fashion pieces among others.

Textile Recycling

Abrishami, Armineh and Doustdar (2024) in a study on textile recycling and recovery; an eco-friendly perspective on textile and garment industries challenges, looked at the available technologies and methods for waste recovery and recycling as well as the uses of products after recycling. The study observed that despite the progress made in waste recycling processes of fashion industry, many deficiencies and challenges still exist. Among these challenges are the problem of collecting and classifying textile waste materials and the presence of contaminants including blends and chemicals. The study also suggested that there is need to create awareness among consumers about the importance of fibre to fibre recycling process, because currently the process in this area is out of proportion to its necessity. This is one of the reasons why the practice of textile recycling is not commonly done by individuals

Jarvis (2023) defined textile recycling as reprocessing pre- consumer and post- consumer textile waste for use in new textile or non-textile products. The study went further to describe pre-consumer textile waste, as textile waste produced in the manufacturing process of items that are destined for our hands. For example, pieces of fabric that are left after a t-shirt is cut out. While post- consumer textile waste is textile waste created by the consumers when unwanted used clothing is thrown away. According to Jarvis (2023) there two types of textile recycling, the mechanical and chemical textile recycling. The mechanical textile recycling involves the physical shredding of textiles into their components source which often results in lower quality materials, while the chemical textile recycling involves adding chemicals to textiles to break down the polymers that make up the materials. This type of recycling produces the same quality of materials as the virgin material but the technology for doing this is currently not readily available

Jarvis (2023) noted that, it is preferable to employ the mechanical textile recycling method, which is simple to undertake on a personal level for unwanted clothing that cannot be upcycled or repurposed. For example, old clothing can be torn up and used as stuffing for pillows and beds, or it can be used to make heat-resistant pot holder pads or dusters. Foot mats can be woven from the torn old fabric by twisting it into a rope. Additionally, they could be utilized as rags for another purpose.

Labayen, Yuan, and Labayen (2022) in a study made a review of textile recycling practices and challenges. The study observed that only 25% of textile waste get recycled or reused while the remaining ends up in landfills. The study aimed to establish reuse and recycling technology (anaerobic, digestion, fermentation, composting, fibre generation and thermal recovery) to manage textile waste. However, it was observed that improved collection systems, automation of sorting and discovering new technology for textile recycling has remained a challenge. Consequent on this the study reaffirmed that reuse is a more preferable option than recycling.

According to Fibre2Fashion (2014) one of the main obstacle in increasing the textile recycling productivity is that clothing comprises of various fibres. Sorting and reprocessing such clothing is a big challenge. Some fibers can be reused but petroleum based fibres like polyester have very little chance of reuse.

Upcycling Strategy

Aus. et al. (2021) made a study on Designing for circular fashion: integrating upcycling into conventional garment manufacturing processes, the paper summarized the result of a more than 5years practice led study on the use of upcycling design and production methods in garment mass production. It was noted that depending on the size of the factory, the fabric leftovers and textile waste generated in garment production ranges from 25%-40% of the total fabric used. The study reported that from experiments 50% of that material can be upcycled into new garments and for some types of leftovers, mainly spreading loss and excess fabric, it can even be up to 80%

According to Behera and Kamble (2021) in a study, textiles are used in many facets of daily life, including the home, where they are used for carpets, window shades, towels, tablecloths, bed linens, and handkerchiefs. In the workplace, they are utilized for things like tents, flags, nets, kites, sails, parachutes, and filters, among other industrial and scientific operations. Automotive applications, medical applications, geotextiles, agro textiles, protective apparel, packaging, and the creation of sophisticated materials like composites are all examples of industrial uses for technical textiles. When it comes to clothing, fast fashion has raised textile consumption, which has raised textile waste. According to the report, the continuous rise in the production and consumption of non-traditional materials has made textile waste a more significant hazard to contemporary civilization.

The study noted that from previous studies, much of what is termed waste textile could be upcycled to produce value- added products. However, the full potential of textiles waste is yet to be realized due to reasons, such as lack of adequate textile waste management system, the complexity of the required treatment of some types of textile materials and poor organization and control over supply chains. The study examined the application of upcycling of waste textiles and ways of utilizing waste textiles to produced upcycled products were explored.

Simple Ecology (2021) acknowledged the growing trend within the sustainability community toward the upcycling strategy of the circular economy which gives textiles waste material purpose by turning them into something more usable. The study noted that the upcycling strategy is most appropriate for fashion, clothing and other textile based items, as they are notorious for producing large amount of waste and various types of pollutions. But upcycling can also be applied to other forms of waste from furniture to tablecloths to empty jars. The study asserted that upcycling is one of the best and (craftiest) strategy of the circular economy. And to buttress this assertion stated that according to National Geographic, only 9% of all the plastic that has ever been created has been recycled. Unlike other materials that remain highly durable and usable after recycling, plastics breaks down and degrade in quality after every use, meaning they cannot be effectively reformed into the same items. For example, it is impossible to re-form the original plastic bottles into new ones.

According to the Ellen MacArthur Foundation, less than 1% of the materials used to make textiles are recycled into new apparel. Thirteen percent of clothing that can be recycled is frequently down cycled for use in lower-value products, such as stuffing and insulation. According to the report, using leftover textiles and resources to make new products is one of the most reliable ways to address the expanding textile waste issue. Although people can upcycle unwanted apparel and textiles, businesses and brands must begin repurposing the leftover materials they generate by upcycling.

Chudi-Duru (2023) maintained that developed countries, have used re-making, re-cycling and

re-purposing different types of materials as strategies to solve problems in their built environment, whereas in Nigeria these strategies have not been properly harnessed. The study focused on the entrepreneurial potentials in recycling, remaking, re-purposing and reproducing fabric wastes and used clothing in Nigeria. And thus observed that wealth and entrepreneurship could be created through the sales of re-made and recycled products.

Repair Strategy

A study by Van der Velden, Maitre-Ekern, and Wanja (2023) looked at the role of independent repair, which is people, organizations, or businesses that fix products without the brand owners' formal consent. The study claimed that repair, and independent repair in particular, is essential to achieving a paradigm shift rooted in regenerative sustainability. The study conducted 25 semi-structured interviews with repairers working in commercial independent repair shops, focusing on the opportunities and challenges in independent repair. The findings of the interviews revealed that the independent repair sector uses various business models and strategies to address the difficulties associated with obtaining reasonably priced and high-quality spare parts.

Additionally, it bridges the gap between throwing away a defective product and paying for a costly authorized repair that is typically covered by warranty or insurance. Likewise, both locally and globally, independent repair supports circular spare part economy. Although Oslo's independent electronic repair industry was the study's primary emphasis, repair techniques can also be used for a wide range of goods, including apparel, shoes, bags, and other related items.

Zhang and Hale (2022), in an earlier study used a theoretical domains framework to examine the factors influencing UK people' repair and reuse of garments. A representative sample of 300 residents of the United Kingdom participated in the survey. Using self-report scales and free text items, the prevalence of and factors influencing clothing repairs and repurposing behavior were assessed. To determine the factors that hinder and facilitate behavior, both quantitative (logic regression) and qualitative (thematic) analysis were employed. According to study results, participants generally engaged in the habit every six months. The primary obstacles were insufficient expertise, poor product design, the high cost of repair services, and identity inconsistency. According to the study, specific behavior change wheels, such training workshops and the offering of free repair and repurpose services, could be used to alter these tendencies.

3.0 Methodology

The study adopted mix research approach. Specifically, descriptive and exploratory research methods were used. Data for the study were collected from primary and secondary sources. The primary data was sourced from personal experience and observations on practical works of repair and upcycling, as well as interviews with field actors such as Tailors, Shoemakers and church groups. While the secondary data was sourced from textbooks, journals and articles relevant to the topic.

The theoretical framework

The theoretical framework for this study is based on the 12th Sustainable Development goal of Responsible Consumption and Production. SDG 12 provides a framework for understanding the environmental, social and economic implications of consumption and production patterns. In the context of this study it encompasses resource efficiency, waste reduction.

3.1 Exploration of upcycling, repair and recycling strategies and items produced.

3.1.1 Upcycling of Pre- consumer textile waste.

Scraps from cutting and trimming during the creation of clothing are examples of pre-consumer textile waste, which is textile waste produced during industrial operations. Awka capital territory's tailor shops produce a significant amount of textile waste, which is frequently disposed of carelessly. Reusing this textile waste through upcycling enables the production of value-added items from the trash,

in addition to reducing the amount of textile waste.

Procedure for producing Table mat by Upcycling Fabric waste

Step 1: The waste fabric will be sorted according to texture and colour.

Step 2: The fabric will be washed to remove dirty, after which it will be dried.

Step 3: The cut out fabric will then be sown into tiny band of continuous rope by constantly attaching the pieces on sewn band until the desired length is obtained see plate 1.

Step 4: The band of rope produced from the waste fabric can be warped on a tapestry loom or arranged in warp yarn formation on a flat surface using masking tape to hold it down firmly onto the surface. See plate 2a.

Step 5: The band of waste fabric that will be used as weft yarn is then interlaced with the warp band at right angle (that is crossing the horizontal band with the vertical band to create a basket weave woven fabric effect until the warp band is exhausted See plate 2b and 3a.

Step 6: After the weaving, bias is used to hem the edges to make it neater. Crocheting is then used on the edges to create salvage and make the piece more appealing see plate 3b.

Plate 1: Waste pre consumer fabric cut out sown into band of rope (Okeke, 2024)

Plate 2a: Warp arrangement of the band of waste fabric

Plate 2b: Preliminary stage of weaving.

(Okeke, 2024)

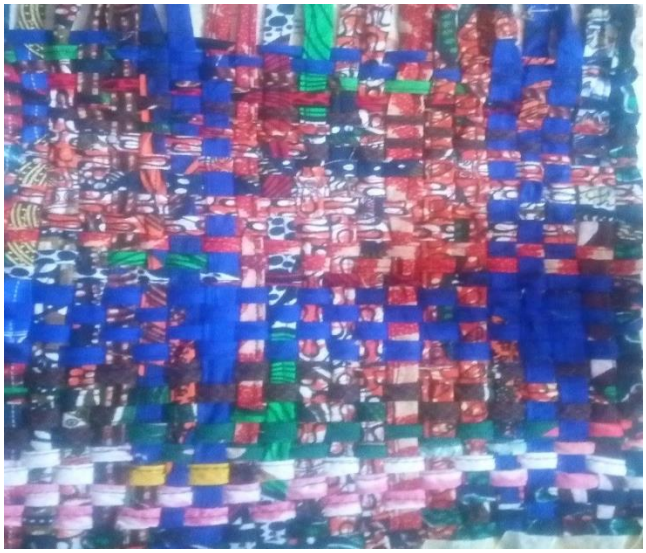

Plate 3a: End of the weaving stage (Okeke, 2024)

Plate 3b: Finished table mat weaved with waste fabric that was turned into a rope band and embellished with crocheted salvage. (Okeke, 2024)

3.1.2 Repair and refurbishing of old sandals

Procedure for refurbishing old sandals using fiber extracted from waste plantain pseudo stem.

The Polyurethane coating or poly coating on the fabric used for the sandals peeled off after using it for some time, but the sole was still strong so instead of discarding the sandals the following procedure was used to refurbish the sandals to extend its life cycle. A Polyurethane is a type of polymer applied to the surface of fabric to give it the appearance of leather.

Step 1: The remaining polyurethane or poly coating on the sandals was scrapped out and the
surface cleaned with wet brush and allowed to dry see the sandal on the right side of
plate 4a

Step 2: The dyed plantain fiber was braided into tiny rope.

Step 3: The rope was laid on the surface of the fabric using glue to hold it onto the surface firmly,

to replace the poly coating on the sandals until the whole surface is covered with the braided fiber. See plate 5

3.1.3 Reuse of Nigeria made and used clothes

It is important to encourage the reuse of Nigeria- made and used clothing here in Nigeria, since exporting it for sales in foreign countries might not be feasible. In this manner, traditional Nigerian clothing that is influenced by the culture can be reused and marketed at a lower cost, protecting the environment from the impact of disposal by burning or dumping in

Plate 4: Sandal with polyurethane coating scrapped out and the preliminary stage of refurbishing with dyed fiber from waste plantain Pseudo stem. (Okeke, 2023)

Plate 5: Repaired or refurbished sandals (Okeke, 2023)

water ways. It will also save natural resource as well as income needed for purchasing new textile material. One of the ways reuse of Nigeria-made and used clothes can be encouraged is through donations.

Clothes that are still in good condition can be donated to extended family members, nonprofit organizations such churches, motherless baby's or old people's home. The researcher during a fieldwork conducted on March 2, 2025, at the Regional Head Quarters of Redeemed Christian Church of God, Seed of David Parish Awka, noted that the Welfare Department, under the direction of Mrs. Nnonyelu, has put up a strategy in place to encourage the reuse of Nigeria used clothes. The area headquarters of Redeemed Christian Church of God, Precious People's Parish under House of Faith zone Awka, have a similar strategy which is called Heaven shop. This strategy involves collecting used clothes from church members and displaying them on every first Sunday of each month for individuals to freely select as needed see plate: 6 and 7.

3.1.4 Recycling of used clothes

Procedure for Recycling of used clothes into insulated pot holder.

The old worn out fabric is usually washed and dried to ensure that it is free from dirt and contaminations.

Step 1: The outer covering of the pot holder is measured according to desired size, and cut out in two pieces.

Step 2: The two pieces are joined by sewing or stitching the edges.

Plate 6: Display of Used cloth and shoes by Welfare Department RCCG Seed of David Church Awka Field work at RCCG Regional H/Qtrs. Awka, Anambra state. (Okeke, 2025)

Plate 7: Selection of Used cloth by people at Welfare Department stand of RCCG Seed of David Church Field work at RCCG Regional H/Qtrs. Awka, Anambra state (Okeke, 2025)

Step 3: The worn fabric that will be used for the stuffing is then shredded into tiny pieces see plate 8a.

4.0 Results and Discussions

4.1 Findings from Interview and Fieldwork

In certain industrialized nations, repair professionals charge by the hour, which is typically very costly. As a result, consumers would rather sell their spoiled goods to developing countries as used goods while purchasing new ones. However, despite the lack of statistics, the repair of worn textiles and associated items like shoes and bags has continued in Nigeria, most likely as a result of the difficult economic climate, and has no connection to the circular economy. Ajibesin (2023) supported this assertion by stating that Nigeria as a country has had circular activities for many years, largely within the informal sector and driven by poverty rather than green thinking. In the field interview carried out at Eke Awka Market, this was affirmed by Stephen, O., a shoe maker and repairer in Eke Awka market Anambra State (personal communication, October 17 2024). According to Stephen who also makes new shoes and sandals the number of people that patronize new shoes have reduced this year in comparison with last year. People rather mends their used shoes and sandals and these days the least he charges for any minor repair is #500.00. Haruna A., another shoe maker in Market 3, Eke Awka market Anambra state (personal communication, October 17 2024) corroborated that more people patronize them for shoe repairs in recent times unlike before.

Plate 8a: Old worn fabric shredded into pieces

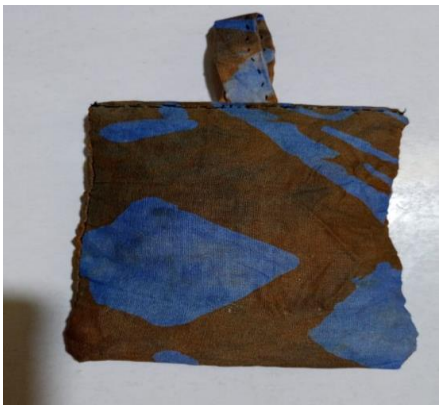

Plate 8b: Outer covering of pot holder sewn along with band to serve as hanger.

Plate 8c: Finished insulated pot holder

(Okeke, 2025)

There are also cloth menders, bag menders, Madam Okafor Theresa is noted in Eke Awka market 3, for mainly mending used cloths and she charges between #1000-#1500 for minor mending. Most often people pay these charges without complaining, because it is usually difficult to get the regular tailors to accept repair works. However, the paucity of studies on textile repair and related items indicates that researchers have not given this topic enough attentions.

It was also observed from the fieldwork carried out that some churches such as Redeemed Christian Church of God and Living Faith Church has put in place strategies that encourages donation and display of used clothes for their members to pick according to their needs. This tactic has given people a way to donate their unwanted clothing rather than burning it or throwing it in a landfill, which would harm the environment. However, more efforts need to be put in place by other organizations to encourage the reuse of made in Nigeria and used in Nigeria clothes because it does not require special skill to practice. More so, Sandin and Peters (2018) asserted that textile reuse has a higher positive impact on the environment than recycling.

4.2 Results from Review Literature

Results of the review indicated that the global economy in 2023 was estimated to be just 7.2% circular, with the linear economy model still dominating, despite the push for a move to a circular economy in the developed countries (Bellini, Anderson, Klungseth, and Tadayon, 2024).

Jarvis (2023) went further to state that, it is preferable to employ the mechanical textile recycling method, which is simple to undertake on a personal level for unwanted clothing that cannot be upcycled or repurposed.

Haq and Rakifull Alam (2023) in a study on the application of circular economy principles in the apparel production process, which focuses on reusing pre-consumer waste for environmental and economic sustainability, after collecting and classifying the reusable cutting waste produced in a Bangladeshi factory, reported that 218.6 kg of surplus fabric, 212.3 kg of reusable cutting waste, and 210 reusable rejected cut panels can be used to create about 2238 pieces of circular products. Compared to recycling, landfilling, and incineration, the study found that direct reutilization of pre-consumer fabric waste is more advantageous for ecological sustainability and economic viability. Jarvis (2023) affirmed this assertion too, stating that mechanical textile recycling is preferable since the technology for chemical recycling is not readily available for everyone. Inference from this, is that strategies such as upcycling, reuse and repair are better options in terms of ecological concern

Though there are pockets of practices of circular economy strategies of reuse, repair, recycling and upcycling in Nigeria, researchers have not given it much attention. This is because scholarly works on these strategies seen were mostly from foreign scholars. Findings from the review, showed that though there is a massive campaign for a shift to circular economy, its application in real world industry setting is majorly by recycling of plastic waste. Recycling is a more complex option, because some fabrics come in poly/cotton/elastane blends, making it very difficult to recycle. In real-world industrial settings, the use of other strategies of circular economy such as reuse, repair and upcycling is yet to be fully exploited. The success of the practical exploration of refurbishing or repairing of spoilt sandal, recycling of old worn out fabric and upcycling of pre consumer fabric waste, is a testament to the effectiveness of this strategies in reducing waste, saving new resource and even creating jobs. Observation made during the fieldwork of people picking Nigeria made and used clothes for reuse has proven that textile reuse can be used to increase resource efficiency and reduce fabric waste generation in Nigeria.

4.3 Benefits of adopting reuse, repair, recycling and upcycling strategy of the Circular Economy

Reusing second hand fabric, shoes and bags is common in Nigeria particularly among low income earners. The second hand market gives

them the opportunity to get fabrics, shoes and bags that meets their different needs at a reduced prize, thus saving the money that would have been spent for the new products as well as saving the environment where it would have been thrown after discarding.

By repairing damaged clothes or restoring worn-out or damaged shoes or bags, you can increase their usefulness. It also saves the customer money that they would have spent on a new bag or sandal. In light of the toxic effects of the polyurethane production techniques used to cover the sandals or bags, repairing or renovating outdated sandals or bags also lessens these effects. According to Yu-City (2013), the synthetic polymer polyurethane, which is used to coat garments to give them the look of leather, is derived from petroleum and poses health and environmental risks. For example, flame retardants are frequently used on polyurethane fabrics due to their inherent flammability, which has been connected to both environmental and health issues. Flame retardants can be harmful, particularly to young children, as they can interfere with hormones and impede growth. The chemicals have the potential to leak into the environment and contaminate it, causing long-term pollution that could damage ecosystems. Repairing products made from polymer polyurethane will minimize the production of new items, thus saving the environment of its negative impact (Yu-City, 2013).

In Nigeria, some unemployed youngsters have found a source of income through repairing or refurbishing leather goods; however, proper paperwork is lacking. The process of upcycling scrap textiles or old clothing into new goods also increases the fabrics' utility while reducing pollution from new production and careless disposal of textile waste. For young people without jobs who decide to investigate these tactics, it can foster innovation and generate employment. It will also be extremely beneficial to those with low incomes who may not be able to pay for the expense of frequently purchasing new goods.

5.0 Conclusion

Nigeria has pockets of reuse, repair, recycling and upcycling processes, therefore the idea of these practice is not wholly new. However, this approach is not taken because people wish to be good environmental stewards, but rather as a coping mechanism for the severe economic realities. In order to motivate more individuals and businesses to adopt the circular economy strategy in the use of textile and related items, it is now critical to increase knowledge of the advantages of these strategies. Some advanced countries have already begun to undergo this change in their textile, polymer, and related industries; Nigeria should accelerate its efforts to avoid falling behind. Creating a sustainable model that maximizes value and reduces waste is the goal of the circular economy. This can be accomplished by moving away from fashion that is meant to be thrown away and toward long-lasting designs that use materials that are reusable, repairable, recyclable, or upcyclable.

Adopting the circular economy particularly as it relates to textile production and consumption will allow Nigeria's textile and related industries to employ less expensive materials for manufacturing by creating new opportunities for innovation and development. They earn money while using fewer new raw materials. Reducing waste, protecting natural resources, and lowering carbon footprints all help the environment. Because the materials are long-lasting and repairable, consumers can save money by not having to purchase new items as often. In addition to helping people cope with the harsh realities of the economy, this study aims to inspire individuals to embrace the reuse, repair, recycling and upcycling strategies as a method to preserve our natural resources, reduce waste, and maintain a healthy environment. Thus, the twelfth Sustainable Development Goal responsible consumption and production is promoted

Notes: N/A
Acknowledgment: N/A
Conflict of Interest: The author stated that there are no conflicts of interest regarding the publication of this article.
Ethics Committee Approval: N/A

Author Contributions: The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.
Financial Disclosure: The author declared that this study has received no financial support.

References

Abrishami, S., Armineh S., and Doustdar O. (2024). Textile Recycling and Recovery: An Eco- Friendly Perspective on Textile and Garment Industries Challenges Retrieved from https://journals.sagepub.com/doi/10.1177/0040 5175241247806 on February 5, 2025

Adeboyejo, A. (2021). The entrepreneurs upcling waste: "my wish is to rid Nigeria of plastics" Footprint magazine 31st March 2021 retrieved from https://www.footprintmag.net on February 5, 2025

Africa Collect Textiles () Textile Collection for Re-use and Re-cycling in Lagos Nigeria- Final Report: Feasibility Study, Phase 1 Retrieved from https://africacollecttextiles.com on 18/02/2025

Ajibesin, O. (2023). Unlocking Nigeria's Future through the Circular Economy Retrieved From www.circularinnovationlab.com on 16/02/2023

Akanji, M., Amoah, N., Akpoveso, O.T. and Atanya O.I. (2023). A Review of The Circular Economy In Nigeria From Rhetoric to Enterprise Development Retrieved from https://www.researchgate.net/publication/3757 56000 on 12/02/2025

Aranda, F.L., Zuniga, M. and Rivas, B.L. (2023). Polymers in Circular Economy: A Comprehensive Approach to Sustainability. An overview. *Journal of Chilean Society* online version ISSN 0717-9707 retrieved from http://dx.doi.org/10.4067/s0717-97072023000305950 on 9/10/2024

Aus, R., Moora, H., Vihma, M., Unt, R., Kiisa, M.and Kapur, S. (2021). Designing for circular fashion: integrating upcycling into conventional garment manufacturing processes. Fash Text 8, 34(2021) retrieved from https://doi.org/10.1186/s40691-021-00262-9 on 13/10/2024

Bayraktaroğlu, S., and İdemen, E. (2024). Redefining repair as a value co-creation process for circular economy: Facilitated do-it-yourself repair. *International Journal of Design*, 18(1), 1-22 https://doi.org/10.57698/v18i1.01 on Retrieved on 17/10/24

Chudi-Duru, C. C. (2023). Re-making, Re-cycling and Re-Purposing of Discarded Fabrics and Cloth Wears as Sustainable Entrepreneurship for Wealth Creation Coou *African Journal of Environmental Research* Vol.4, No. 1, 2023.pp 177-200 Retrieved on 17/02/25

Delanoeije, J., and Bachus, K. (2020). Reuse The Understudied Circular Economy Strategy retrieved from https://www.researchgate.net/publication/3508 22893-Reuse-The-understudied-circular-economy-strategy

Edom, S. (2023). How to Start a Clothing Recycling Business in Nigeria and African Retrieved from https://ayeorganization.com/2023how-to-start-a-clothing-recycling-business-in-nigeria-africa on 18\6/02/2025.

Ellen MacArthur Foundation https://www.ellenmacarthurfoundation.org Retrieved on 03/02/25

European parliament (2023). Circular economy: definition, importance and benefits. Retrieved from https://www.europarl.europa.eu on 20/04/2025

Fibre2Fashion, (2014). *Textile Recycling: A Step Towards Sustainability* Retrieved from fibre2fashion.com on 06/03/2025

Hartini, S., Rumita, R. and Al Huda, M.H. (2022). Upcycle strategy on tree branches to improve eco-efficiency towards a circular economy using life cycle assessment. Retrieved from https://iopscience.iop.org/article 21/10/2024

Haq, U.N., and Rakifull Alam, S. M. (2023). *Implementing circular economy principles in the apparel production process: Reusing pre-consumer waste for sustainability of the environment and economy*. Retrieved from https://doi.org/10.1016/j.clwas.2023.100108 21/10/2024

Heras-Saizarbitoria, I., Boiral, O., Testa, F. (2023). *Circular Economy at company level: an empirical study based on sustainability reports*. Retrieved from https://doi.org/10.1002/sd.2507 21/10/2024

Jarvis, K. (2023). Is textile recycling greenwashing or an actual waste solution? Here ‘s everything you need to know. Retrieved from https://adropintheoceanshop.com on 25/02/2025

Kamble, Z., and Behera, B.K. (2021). Upcycling textile wastes: challenges and innovations Textile Progress 53 (2) 65-122 Retrieved https://www.researchgate.net/publication/357729154-Upcycling-textile-waste-challenges-and-innovations on 22/10/2024

Labayen, J.J, Yuan, Q. and Labayen, I. (2022). *A Review on Textile Recycling Practices and Challenges*. Retrieved from https://www.researchgate.net/publication/359290082_A_Review_on_Textile_Recycling_Practices_and_Challenges DOI:10.3390/textiles2010010 on 14/03/2025

Malooly, L. and Daphne, T. (2023). R-Strategies for a Circular Economy. Retrieved on 17/10/24 https://www.circularise.com/blogs/r-strategies-for-a-circular-economy#top

Nkanta, I. (2024). The Circular Economy as A Pathway to Sustainable Development in Nigeria Retrieved from https://360.rmdc.gov.ng/the-circular-economy-as-a-pathway-to-sustainable-development-in-nigeria/ on 16/02/ 2025

Sai, A.O., Quansah, S.A. and Acquaye, R. (2022). Recycling Fabric Waste Into Functional Interior Decoration Pieces. *Journal of Art and Design.* retrieved from www.scipublications.com on 11/02/2025

Sandin, G. and Peters, G.M. (2018). Environmental Impact of textile Reuse and Recycling- A review. *Journal of Cleaner Production.* Vol.184, May 2018, pages 353-365

Simple Ecology (2021). Upcycling and the Textile waste Problem Retrieved from https://www.simplyecology.com/blog/upcycing-and-textile-waste 22/10/2024

Swarna, P.M. (2023). The Importance of Sustainable Textile Manufacturing (Massachusetts Institute of Technology) downloaded from https://www.linkedin.com/pulse/importance-sustainable-textile-manufacturing-swarna-prabha-mohanty/ 28/10/.2024

Van der Velden, M., Maitre- Ekern, E. and Wanja, D.K. (2023). The Role of Independent Repair in a circular and Regenerative Economy Retrieved from https://doi.org/10.1007/s43615-023-00304-y on 22/10/2024

Yu-City (2013). Polyurethane Fabric: What is PU and What is it used for retrieved on 27/10/2024 from https://www.yu-city.com/trends.php?act=view&no=18

Zhang, L. and Hale, J. (2022). Extending The Lifetime of Clothing Through Repair and Repurpose: An Investigation of Barriers and Enablers in UK Citizens Retrieved from https://www.mdpi.com/2071-1050/14/17/10821 on 16/02/ 2025