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Review Article

Recycling Fabric Waste into Functional Interior Decoration Pieces

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Abstract: This study seeks to collect, recycle and repurpose fabrics waste into decorative household items to reinforce the concept of recycling as a viable alternative to indiscriminate dumping that leads to environmental pollution. It has been observed that garment producers, fashion designers, dressmakers, seamstresses and tailors generate several quantities of fabric waste which are initially piled up to occupy space at their workshops then later disposed indiscriminately. For this studio-based study, an average of 300kg of fabric remnants which are generated by the 30 workshops of garment producers in four suburbs of Kumasi in the Ashanti region of Ghana were collected. The fabric waste was sorted into types, sizes, colours and textures, out of the 300kg collected, approximately 250kg were identified as cotton and the remaining 50kg were an assortment of polyester, nylon, rayon, wool, acetate and sateen. It also came out that the garment producers lack adequate knowledge on waste management, hence the indiscriminate disposal of the waste fabrics. The need for effective means of recycling without adverse repercussion to the environment was found critical. Based on the idea of recycle art, 280 kilograms of the fabric waste collected were converted into interior decoration pieces such as a pair of footrest, a set of arm rest, a set of chair-back, Others include a set of table mats, a set of placemats, a door mat, and a set of curtains and window blinds. It is anticipated that such craft activities will serves as pointers to craft people about the potential of waste fabrics as cheaper raw materials for diverse products and by extension help to reduce the waste management problems associated with fabric waste.

Keywords: Recycling; Fashion Design; Textiles; Interior Decoration; Fabric Waste

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1. Introduction

This study seeks to assess the rate of fabric waste generation in selected suburbs of Kumasi and identify strategic means of converting the waste into products for interior decoration. The textile manufacturing industry and its allied sectors such as clothing and fashion serve as significant socio-economic ventures that present several jobs and wealth creation advantages for revenue generation. It has been realised that in the quest of the textile and fashion industry to meet the high demands for clothing to cover the nakedness of humanity, several tons of waste are generated which usually are not properly managed, but indiscriminately disposed-off to cause environmental problems [1]. The situation is, therefore, very disturbing particularly in this era when efforts are being made by governments of various countries to save the environment by engaging in reducing, reusing and recycling technologies to curtail climate change and global warming.

The need for man to cloth himself to meet socio-cultural, religious, political and economic standards has always necessitated the ubiquitous dependency and utility of various forms of textile materials in diverse aspects of the lifestyle. The high demand for fabric has caused textile manufacturers in China, Netherlands, United States and other countries to expand into new product lines to maximize their capacities. [1] further stated that the

processes involved in textile manufacturing generate several tons of gas, solid and liquid wastes which are mostly released into streams and landfills without proper management. The clothing industry which is growing daily in Milan, Paris, London, New York and across the globe also generates quantities of fabric waste which in most cases are not managed properly.

In Ghana, it has been observed that the expansion of clothing fashion trends and construction of fabric into fashionable clothes by dressmakers generate several quantities of off-cuts or remnants which are piled up to occupy space at the workshops with the hope of finding future usage for them. Eventually, the pieces are considered as scraps when no valuable application is found. The danger here is the means of disposal, which is either by burning, burying in the ground or dumping at landfills. In whichever way it is done, the waste management could be described as poor, because of the negative impact on the environment as well as human existence. In some cases it is a common practice to find the off-cut fabrics thrown into gutters by dressmakers especially when it is raining. This results in blocking of drainage systems causing serious flood occasionally in most communities. The inexcusable situation of indiscriminate disposal of fabric waste in the country as a result of poor waste management practices, and the dangers they pose to human lives and the environment present a favourable ground for critical investigation into how fabric remnants (offcuts) can be managed by converting them into interior decorative pieces.

The concept of recycling dwells mainly on finding another utility for an object after its intended purpose of manufacturing has been exhausted. According to [2] reuse is to use an item again after it has been used. This includes conventional and unconventional reuse. Conventional reuse is where the item is used again for the same function. 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. There is another recycling concept known as repurposing that is, giving something a new purpose or altering the existing function of something to make it more suited for a different purpose. Sometimes reuse of objects for a different purpose without alteration can also be referred to as repurpose. As a concept of environmental conservation, reuse thrives on the quest to find other utility for things which have exhausted their original functionalities. Recycling or repurpose in this context connotes a way to create something new from by-products and in this instance fabric waste to decorative pieces.

1.1. Fabric Waste

Fabric remnant or waste in this context referred to as a small piece of cloth that is left after the rest of the cloth has been sold; a remaining, usually small part, quantity, number, or the like, a fragment or scrap, a small, unsold or unused piece of cloth. Fabric remnants are declared as waste and disposed of usually after production. According to [3] "waste is defined as anything left over or superfluous, as excess material or by-products, anything rejected or useless, worthless or unwanted". Textile and apparel waste are categorised as post producer waste generated by manufacturers, pre-consumer waste generated by retailers and post-consumer waste generated by the public. This could be termed as textile waste lifecycle. For this study, pre-consumer waste collected from shop floors of garment manufacturers would be the main focus. [3] further stated that environmental protection awareness has become relevant to big textile manufacturers, and subsequently the word "recycling" has been in common usage in recent years. But finding ways of recycling textile waste as alternative to landfill disposal is an ecological problem of which textile/apparel industry is already working, to develop a textile waste lifecycle model to reduce the textile waste in all categories of textile and apparel waste.

More than a decade and half ago, [4] posited that due to global environmental concerns, a large number of companies were currently developing manufacturing processes using alternative materials for their products, and also seeking new markets for the sub-products and by-products of their first-line production. They also pointed out that due to

the higher prices for raw materials, especially, man-made fibres, it will be of utmost importance to recycle some of the waste. However, [3] had argued earlier that in spite of the boost in waste recycling, the major issue facing the recycling efforts of textile and apparel manufacturers is lack of market for recycled products as against high cost of processing. By implication, to small companies that generate less waste, the cost of recycling will be too high. They, therefore, called for a proper cost-benefit analysis of small-scale textile producers on recycling.

In 2004, [5] investigated South Africa's textile industry regarding recycling practices. A questionnaire and mail survey was done considering 103 textile manufacturers including small, medium and large textile manufacturers. Out of highly ranked 10 statements asked in the questionnaire, most of the companies would purchase carpets from recycled textile materials, and added that they would manufacture apparel or other textile products made from recycled textile materials. [5] concluded in the research that uncertainty of market strategies could be the economic barriers, as textile recycling is not cost effective in general, even though most industries advised the strong trade demand through market strategy. In Nigeria, [6] investigated the poor and inappropriate nature in which the Textile and Clothing Industry in Nigeria manage their industrial waste. His research focused on the effect of off-cuts, chemical wastes in Clothing and Textile production on human health and environmental sanitation in Abeokuta the capital of Ogun State southwest of Nigeria. The findings indicated that fabric wastes and textiles have negative effects on the people of the area and the environment as well, hence the need for effective means of recycling. On the basis of the findings, [6] recommended that enlightenment programmes be initiated which would educate local cloth and textile producers on ways in which these wastes can be recycled and managed. Another research work on textile waste recycle done by [7] estimates that up to 95% of the textile waste that are land-filled or incinerated every year could be recycled.

Caulfield [8] also acknowledges that recovering textile waste or recycling is a multi-billion-dollar global industry that performs a vital social and environmental function and provides employment for millions of people all around the world. The cloths are usually stripped of all added materials such as buttons and zips before being cut into strips to make the wiping rags. The use of textile waste as a filling or flocking material in the United Kingdom has benefited greatly from its legislation prohibiting the use of foam in certain furnishings. Textile waste find applications in a wide range of other purposes such as for soundproof blocks, insulation, roofing felt, and as pollution control filters. By recycling textile waste, there is a correlative reduction in the demand and use of virgin resources. [9] states that only a small portion of each waste type is being recycled or reused today. In an era of limited resources and increasing population, it is desirable to reclaim and reuse as many resources as possible but this is not the case, as much of the cotton waste that is generated goes directly to landfills. From the various viewpoints, finding appropriate purposes for waste fabric is a positive way to reduce the negative impact caused when fabric offcuts are thrown away indiscriminately. This study, therefore, collects, recycles and repurposes fabrics waste into a number of household decorative items to reinforce the concept of recycling as a viable alternative to indiscriminate dumping that leads to environmental pollution.

2. Materials and Methods

Since the study aimed at designing and producing artifacts for interior decoration from waste fabrics, the studio based experimental method was adopted as an approach to achieve the study aims. According to [10] and [11] data gathered with such a design provides a more accurate picture of events and seeks to explain people's perception and behaviour on the basis of data gathered at a point in time. In the survey, the researcher visited selected workshops of tailors and dressmakers to conduct an observation of quantities of fabric remnants generated in each shop. During the observation period, remnant of

fabrics were collected for the experimental production of artifacts for interior decoration. It is important to state that the descriptive method of qualitative research has been used to sequentially report on the logical facts and ideas observed during the survey, and it specifically served as an approach for presenting a vivid perspective of data collected from the shops.

In the fabric waste collection process, bins and sacks were placed at the 20 garment production shops sampled for the study in selected dress making outfits in Kumasi for periodic collection. The collections were done every three days and the pieces were weighed after every collection for a period of 12 months (January-December 2020). It is important to state here that the sorting of the pieces collected were done based on fabric type, size, shape and colour. The method used was hand sorting by picking and separation. The pieces were classified and graded as grade 1, grade 2 and grade 3. Those with dimensions of 1 inch to 4 inches were classified as grade 3. Those which fell within 4 inches to 8 inches were classified as grade 2, and those with dimensions of 8 inches to more than a yard was classified as grade 1. The intention of the classification was to help identify and attach the appropriate utility to the classified size ranges, colours and material types for the production. In total, an average of 300 kilograms of fabric waste were collected from the 20 workshops of tailors and seamstresses selected for the study. After sorting the fabric waste into types, sizes, colours and textures, it became evident that out of the 300kg collected, 250kg were found to be cotton and 50kg were polyester, nylon, rayon, wool, acetate and other synthetic fabrics.

2.1. Studio Based Experiments

From the viewpoint of adding value and relevance to remnants of fabrics gathered from shop floors of fashion designers and dressmakers, the experimental approach of research was found applicable primarily to gather data that informed the apparent practical activities conducted towards bringing to bear the socio-economic value that can be associated with fabric remnants discarded as waste by dressmakers and disposed-off indiscriminately to cause environmental problems. In producing the selected interior decoration pieces from fabric remnants, the processes of idea development, sketches and measurements, template cutting, construction and experimental results obtained through art studio conditions are explained. As emphasized by [12], experiments well monitored generate the needed results, and should not be devoid of increasing efficiency, accuracy and precision of measurement. The study, therefore, paid attention to the appropriateness of tools and equipment used, as well as the efficiency of production methods employed. These were checked to ensure strict cognisance for validity and reliability during the experimentation of converting fabric remnants into decorative pieces.

2.2. General Procedure

Having collected lots of waste fabrics from dressmakers they were sorted into three main categories: linen, cotton and polyester/all other synthetic fabrics. Based on the size range identified as well as the colours, the decorative pieces identified for designing and production were selected as follows: a pair of footrests, a set of arm rest (7 pieces), a set of chair-backs (7 pieces), a set of table mats (7 pieces), a set of placemats (4 pieces for dining table), a door mat, a set of curtains (double window and a door) and window blinds (2 pieces). Considering the variety and irregular nature of the fabric remnants collected, various techniques of garment and fabric products construction were analysed and Patchwork and quilting were strategically selected over knitting, crocheting, and hand-needlework among others, as suitable methods for producing the decorative pieces to serve their intended purposes. The procedures are as follows:

2.2.1. Concept Development and Working Drawings

The ideas and concepts were developed considering the nature of fabric remnant and waste available, and the functions which the interior decoration pieces were identified. Geometrical shapes such as circles, squares and rectangles dominated the designs. Adinkra symbols were used as motifs and colour blending was considered as a strategy to achieve balance, rhythm and harmony in the various design compositions. Also, the main technique employed was patchwork through machine sewing. Other supporting techniques included quilting, embroidery, applique and knitting.

2.2.2. Materials, Tools and Equipment

Materials, tools and equipment includes scissors, sewing machine, office pins, embroidery machine, knitting machine, ruler, tape measure, and tailors' chalk. Aside the fabric offcuts used as the main material, other supporting materials employed were cushion (foam), lining (polyester), stiffeners, sewing thread, sateen biers, fringes, buttons and transparent rubber foil.

2.2.3. Design and Production of a Pair of Footrests

The pair of footrests was designed using circles to depict 3D features which measure 6.5 inches in height, by 20 inches in diameter by 60 inches in circumference (Figure 1). The footrest was designed with the basic shape of a circle to portray roundness and continuity. The circle was drawn repeatedly in concentric manner and divided with repeated diameter lines to creatively represent the spider web as shown in Figure 2.

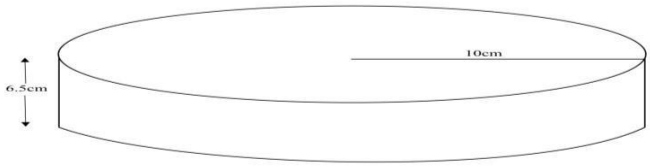

Figure 1. Dimensions of the designed footrest

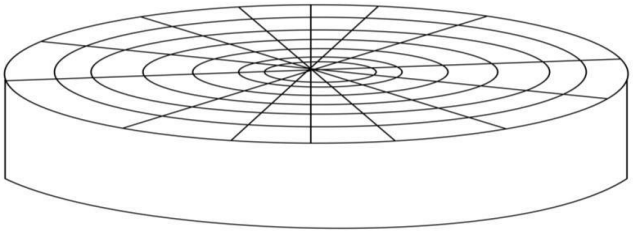

Figure 2. Spider web design of the footrest

After the design has been completed, the production process made use of patchwork as the main joining method. It required the cutting of colourful fabric pieces into square shapes in dimensions of 4 inches to 6 inches. The fabrics used were those classified as grade 2 which had average measurements 4 inches by 8 inches. The sewing followed a pattern that made it possible for the joints to flow in a mixture of horizontal rhythm. The chosen colours were purposefully balanced. Quilting was done with cream thread in diagonal and concentric circles to depict the effect of spider web design on the top**.** Assembling of the top and base to the gusset, biers were used to pipe the peripherals to guarantee strength and avoid fraying (Figure 3). The footrests were filled with a mixture of fabric waste and cushion to make them puffy for comfort during usage. The final product is shown in Figure 4.

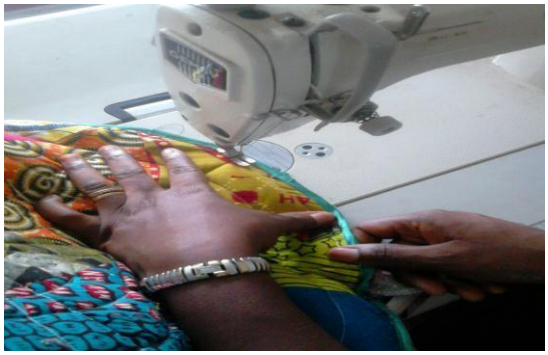

Figure 3. Piping the joints of the footrest

Figure 4. Finished pair of footrests produced from fabric waste and remnants

2.2.4. Design and Production of a Set of Arm Rest or Chair Cushions

The design concept of the set of arm rest was based on square shapes with rounded angles. Each measures 14 inches square vertically and horizontally, with a design of rose flower as the central motif as shown in Figure 5.

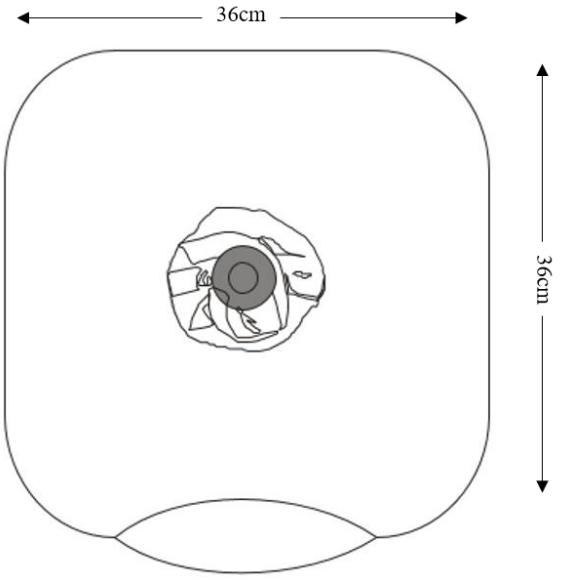

Figure 5. Outline drawing of each arm rest

Having selected the fabric pieces and colour combinations, the waste fabrics were cut into a mixture of rectangular and square shapes and sewn together using the patchwork approach. The fabric was trimmed to acquire the 14 inches square measurement (Figure 6). The base was then covered with light foam, and the surface of fabric was quilted to project the mini-square shapes. The base was also made with fabric pieces and fixed with a zip to allow stuffing of the armrests.

Figure 6. Cutting out the square shape

The top and base were finally assembled with green biers at the edges to secure and strengthen the joints. A piece of yellow cotton fabric was folded and fixed to the top with pink button and cream thread to depict a rose flower as decoration. As shown in Figure 7, the seven pieces of footrest were produced and stuffed with a mixture of grade 3 fabric waste and foam to puff it and enhance comfort in usage.

Figure 7. Finished arm rests (7 pieces)

2.2.5. Production of a Set of Chair-Backs

The set of chair back was made up of 7 pieces, and the design depicts a rectangular shape with curved base and a bold Sankofa central motif. Each chair back measures 26 inches by 14 inches in length and width (Figure 8).

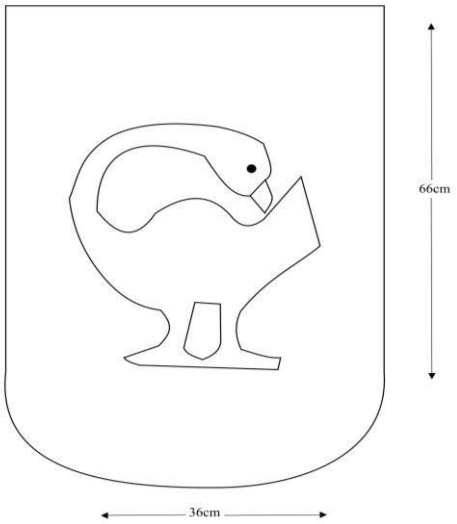

Figure 8. Design outline of the chair backs with motif from the Sankofa symbol

The chair backs were made with multi coloured cotton fabric pieces which were selected from the fabric remnant classified as grade 2 which had average measurements of 4 inches by 8 inches. Sewing served as the main method of joining the pieces. The fabric pieces were cut into square and rectangular shapes which were sewn together in vertical flow. The colours were balanced. The Sankofa symbols were cut out and reinforced with fabric stiffner at the base and embroidered to the surface permanently. The stiff was then covered with yellow cotton fabric and fixed to the front of the chair back. With cream polyester serving as lining, the back was covered. The peripherals were attached with cream fringes to serve as decoration. Figure 9 is the final display of chair backs produced.

Figure 9. A set of chair backs and arm rest from fabric remnants

2.2.6. Production of the Table Mat (Coffee Table Runners)

The production of the table mat set was an idea developed to join pieces of fabric waste together to form coverings for decorating four (4) living room coffee tables, plus a large size centre table. The table mats were designed to depict square geometrical shapes. The measurement for the coffee table mats was 10 inches square (Figure 10), and the large centre table mat measured 10 inches by 14 inches.

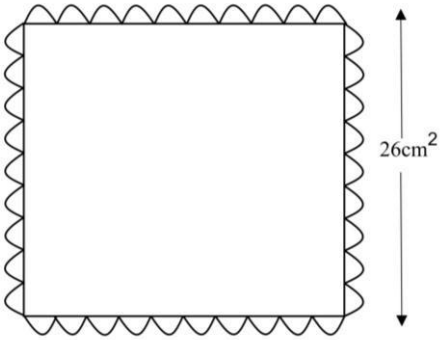

Figure 10. Design for coffee table mat

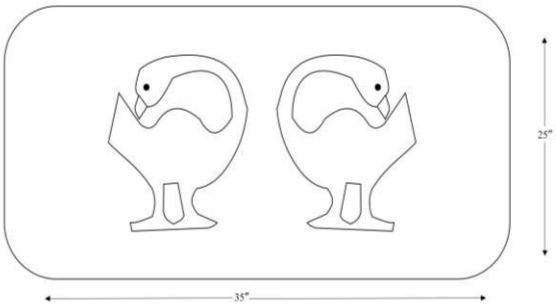

Figure 11. Design for centre table

In the production process, sewing was used as the method of joining, although varied shapes of fabric pieces were put together. The large sized central table mat was also designed in a rectangular shape with smooth rounded corners, and two (2) bold Sankofa central motifs as shown in Figure 11. The fabric remnants used were selected from the pieces classified as grade 2. The fabric pieces were in diverse shapes, so they were joined in a mixed pattern manner to balance the colours. Since coffee tables are usually small in size, fabric remnants are ideal for sewing table runners. This also gave the option of tailoring the mats to form the shape of coffee table in square and rectangular shapes for the centre table.

Figure 12. Lining and stitching over the fringes

Figure 13. Stitching around the *Sankofa* with embroidery technique

Figure 14. A set of finished table mats (coffee and centre mats)

2.2.7. Production of a Set of Placemats (4 pieces for dining table)

The set of place mat was made up of 4 pieces. They were in a rectangular shape with smoothly curved ends. Each placemats measures 13.4 inches by 10.3 inches in length and width (Figure 15). They were also designed to allow the fixing of transparent rubber foil as lamination. This was meant to avoid soiling the placemats when used at dinner and also to allow easy cleaning.

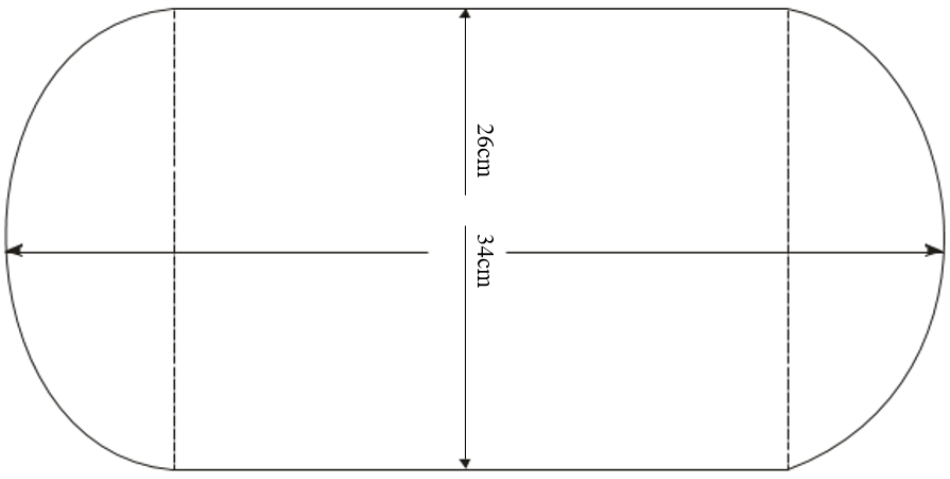

Figure 15. Dimension of the place mat

Figure 16. A set of place mats (for dining table)

2.2.8. Production of a Doormat

In the planning stages of the door mat, it became expedient to consider the use of the grade three fabric pieces which measured in a range of half inch to 4 inches. These were the smallest of the fabric remnants and waste obtained after sorting. In the production process, the researcher depended on knotting method for fastening fabric pieces to cords laid on a wooden frame. In the execution process, a strong wooden frame measuring 29 inches by 23 inches width and length respectively was made and 3mm nylon cords were laid firmly on set of nails fixed to a frame at equal intervals of 3cm as shown in Figure 17.

Figure 17. Wooden frame with nails of 2cm interspacing

The fabric pieces were cut into half inch by 5 inches in length and breadth, and were tied to form knots one by one and line-by-line. The knotting was done to create anchors on every two cords on the frame (Figure 18). The process was carried out repeatedly till all the cords were covered with fabric pieces. The cords were then removed from the frame, and their tops were then trimmed to achieve evenness and also to enhance the aesthetic quality of the door mat.

Figure 18. Fabric remnant knotted to nylon cords on the wooden frame for door mat

Figure 19. Finished door mat

2.2.9. Production of a Set of Curtains (double window and door)

The curtain was designed as a sample for a double window in a living room. It measures 27.5 inches length by 21 inches width. With the intention of hanging on a bar, seven (7) holes were created for metal rings to be fixed. The design outline shown in Figure 20, has adequate width to ensure draping a double window frame in a living room. Additionally, the design portrays an overflow flap with fringes as decoration.

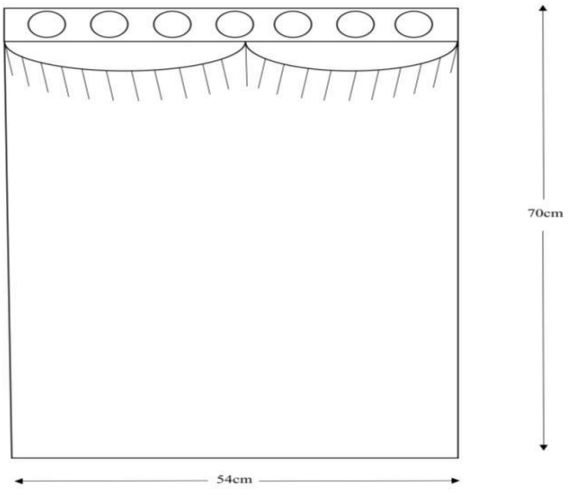

Figure 20. Design layout for the curtains

Fabric remnants are perfect size for sewing home décor pillows, pillow cases, or chair cushions. From the fabrics sorted and classified as grade 1, the researcher could find sizes of 8 inches to one-yard remnant of cotton fabric, which were cut into rectangular and square shapes and sewn to obtain a large size of patch cloth. This project simply involved measuring, cutting, joining and lining the back with polyester fabric. With creativity as the bedrock, the researcher had the options of joining the pieces in a mixture of vertical and horizontal patterns to instill harmony, rhythm and balance of colours.

Figure 21. Stitching the edges of the curtain and attaching frays to the finished work

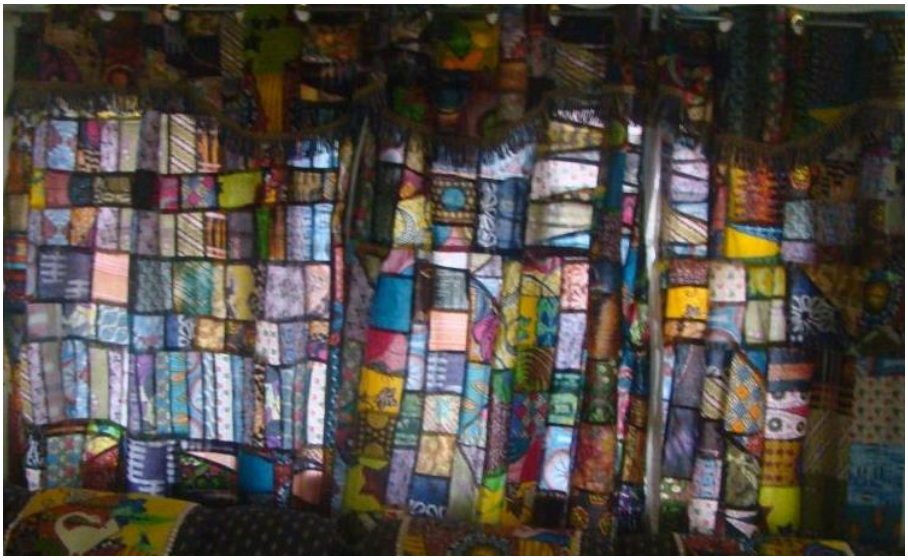

Figure 22. Final window and door curtains produced

2.2.10. Production of Window Blinds - Vertical Strips Design

The window blinds were two samples designed to serve as curtains for two double windows in a living room. Basically, they were made up of straps of 5 inches by 45.5 inches length making use of fabric pieces classified as grade 1 and 2. The straps were 16 pieces in each window blind which were meant to hang on specially made plastic bars with the mechanism for drawing the curtain straps to open and close. The straps also had spaces provided for plastic weights in supporting the blinds to close well.

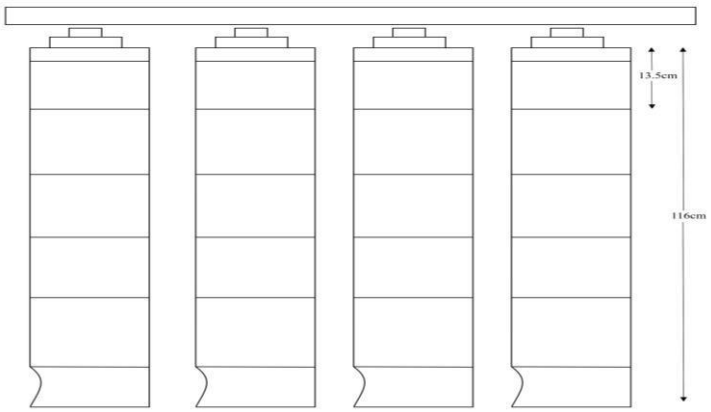

Figure 22. Design outline for window blind

The fabric pieces were measured with 4 inches by 5.5 inches and cut with the help of templates. To attain thickness in texture, both front and back covered with the fabric straps were fused with vilene for reinforcing each sewn straps which were pressed and covered with another design straps shown in Figure 23 and 24.

Figure 23. Reinforcing the Fabric Strips with Vilene

Figure 24. Joining the pieces to ac**quire the finished blind straps**

2.2.11. Production of Window Blinds - Zigzag Strips Design

The straps of the second sample of the window blinds were also designed for a double window in a living room. They were designed with zigzag straps made up of 5 inches width by 55.6 inches length making use of fabric pieces with bright plain colours classified as grade 1 and 2 as show in Figure 25.

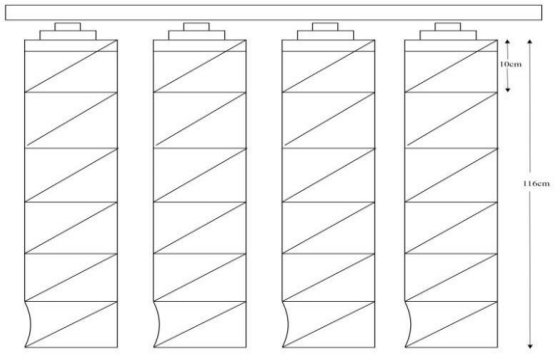

Figure 25. Design Outline for Window Blind

Each square of the straps were cut from the selected colourful plain fabrics which measured 4 inches by 5.5 inches. They were shaped in squares and joined together to form a roll. The square fabrics were then sewn with the help of sewing machine and reinforced with vilene. The straps were turned inside and ironed for flatness. The straps were 16 pieces in each window blind which were also meant to hang on specially made plastic bars with the mechanism for drawing the curtain straps to open and close. The straps also had spaces provided for plastic weights in supporting the blinds to close well as done in the first sample. Figure 26, 27, 28 and 29 illustrate the production process of the blind.

Figure 26. Square Fabric Shapes Joined for the Curtain Blinds

Figure 27. Sewing the ends of the straps to acquire the final pieces for the blinds

Figure 28. Sewn straps

Figure 29. Finished Blind

3. Discussion

All the products were done via low tech and cost-effective processes and that made the overall production cost relatively moderate. In total, approximately 280 kilograms of the fabric waste collected were converted into interior decoration pieces such as a pair of footrests, a set of arm rests (7 pieces), a set of chair-backs (7 pieces) a set of table mats (7 pieces), a set of placemats (4 pieces), a door mat, a set of curtains (double window and a door) and a set of window blind. The pair of footrest produced was designed using circles to depict continuity and spider web. The pair was meant for resting the feet when one sits in the sofas in the living room. The samples were designed and produced using the fabric

pieces classified as grade 2 which made it possible to make both vertical and horizontal joints by sewing to show creativity. The multi-coloured fabrics joined together yielded broad pieces of textile from which the circular shapes of the top and base were cut. The spider web design quilted on the surface also added a touch to the aesthetics, particularly the enhancement created by the cream thread used for the seams.

The arm rest design was based on square shape and the joints of the fabric pieces together created a mixture of vertical and horizontal flow of joints and patterns which blended well into the multi-coloured fabric. The quilted cream lines also created aesthetics which blend into the colours of the fabric. The piece of yellow fabric fixed on the middle of the top with pink button to give a rose flower design which projects well with the surfaces. When tested, it was noticed that the puffy nature of arm rest samples make it easy to use since the foam and fabric waste used in filling created the effect of softness. The set of chair back designs were made in rectangular shape with curved base and a bold Sankofa central motif. The embroidered surface of the Sankofa motif made the design bold on the surface. The multi coloured nature of the chair backs created a good blend with the upholstery material of the sofas. The width of the chair backs also spread well on the top part of the sofa and the length also spread appropriately to project the Sankofa motif.

As indicated above, the curtain blinds samples were produced with the fabric waste classified as grade 1, due to the length expected. This created a well-balanced harmony of colours in both designs created for the two samples of window blinds. The pattern of the joints created a rhythm of zigzag movement in the multi coloured blend design. The second design had only plain colours and the joints were only horizontal with the colours showing definite flows. In both designs the strips could stand firm and straight, thereby enhancing the ability of the strips to cover the windows well. The hanging bars with the plastic holders and pulling cords made the blinds operate efficiently. Also the plastic weights fixed at the base of each strip of the blinds also helped in pulling and stretching the curtain blinds. The stiffener fixed in between the front and back fabrics also enhanced rigidity and firmness of the blinds. Overall, the various product outcomes during these experiments came out good and functional.

4. Conclusion

Evidence adduced from this study indicated that the rate of fabric waste generation in the study areas within the Kumasi Metropolis is phenomenal. Tailors, seamstresses and fashion designers must be of a necessity trained in sustainable ways of managing the waste. They still believe that storing the pieces with the hope of future utility, or burning, or disposing them at the landfill is the best solution. Fabric remnant and fabric waste have been identified as the two main offcuts of textile materials generated, and they are not only from the shop floors of clothes makers, but also the textiles retailing shops where pieces of left-over fabrics are piled up after cutting from the main yardage. The awareness creation on the essential need to manage and dispose-off fabric remnants generated at the shop floors of seamstresses, fashion designers and dressmakers in the study area has not been done effectively among the people who are engaged in the professional trade of making clothes.

It can be concluded in this study that the project has highlighted the quantum of waste fabric generated in a period of one year in 30 shops in Kumasi. The socioeconomic usefulness that can be attached to fabric offcuts and waste through creative skills and techniques of Recycle Art, that is, reuse and repurpose. The amount of fabric remnants employed in the entire production of the interior decoration artifacts contributes significantly to ease pressure on landfills and places like gutters and roadsides where fabrics regarded as waste materials are usually disposed of.

On the basis of these findings, the researchers recommended that various agencies should organize sensitization programmes which would educate garment producers on ways in which these wastes can be recycled and managed. The study also urges Ghana

Education Service (GES) to organize annual workshops for creative art teachers in primary and junior high schools to train them on the hand papermaking processes using fabric waste. Schools in Ghana must also set up practical recycling programmes and activities in their schools, to help instil the need and importance of recycling of waste materials in students. To sustain recycling programmes and activities in schools, heads of schools must be willing to provide basic equipment and tools that students will need to work with. The National Commission on Civic Education must team up with the Environmental Protection Agency of Ghana to embark on education and sensitization for fashion designers and dressmakers on the need to manage fabric waste properly, particularly through repurpose of fabric remnants generated from their workshops. The Ministry of Education, Ministry of Trade and Industry and Ministry of Environment, Science and Technology should team up with the Vocational and Technical Education sector to conduct periodic workshops and seminars towards building the capacity of fashion designers and dressmakers in creative and technical approaches in expanding their production to cover the conversion of remnants and waste fabrics into artifacts such as dusters, bow-tie, bags, belts, curtains, table covers and mats among others.

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