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The Use of Composite Textile Techniques as Upholstery Fabric for Interior Furnishing

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Abstract:

This is an art studio Practice-based study that employed the creativity of using Ikat technique, Embroidery technique, leather material, and woven Kente fabric from cotton and rayon yarns to create the design for the production of artistic Upholstery for interior furnishing, using yarn dyeing, traditional loom, and sewing and embroidery techniques in textiles. While plain cotton and synthetic materials for Sofa production abounds in Ghana, the study found the combination of Ikat technique, embroidery, woven kente and leather as a composite material in the production of upholstery in Ghana not exploited in the Upholstery industries. Descriptive and studio/practice-based research methods were employed under the qualitative research approach as the research design for the study. The study presents systematic processes involved in the production of upholstery design for sofas. The study proved that the medium chosen is good for upholstery design for sofas in interior furnishing. Weaving techniques were used to generate a well-defined weave structure from dyed yarns which was augmented by leather material woven in a twill structure with embroidery stitches. All the techniques combined yielded a good design for Upholstery.

Keywords: Textile techniques, upholstery, innovation, production, interior furnishing

1. Introduction

The term 'Upholstery' refers to sofas, chairs and other seating with permanently attached covers of fabric or leather. The two important features of Upholstery fabrics are form and function (Kelley, 2009). According to Columbia Encyclopaedia (2009), upholstery is a general term for household fittings, hangings, curtains, cushions and covers. It also refers to stuffed, padded and spring-cushioned furniture, such as chairs and sofas, or to the usually decorative materials and fabrics that cover them. Upholstery is the work of providing furniture, especially seats, with padding, springs, webbing, and fabric or leather covers. The word upholstery comes from the Middle English words - Up and Holden, meaning 'to hold up'. The term is applied to domestic furniture and also to automobiles, aeroplanes and boats (Upholstery, 2010). The conceptual application of 'Upholstery' in the project is defined as the decorative materials and fabrics used in covering furniture, specifically woven Upholstery fabrics. Middle English words - Up and Holden, meaning 'to hold up'. The term is applied to domestic furniture and also to automobiles, aeroplanes and boats (Upholstery, 2010). The conceptual application of 'Upholstery' in the project is defined as the decorative materials and fabrics used in covering furniture, specifically woven Upholstery fabrics. The review of 'design' exposes and explains the conceptual application of the word in various fields of study. From (Design and Art, 2009) a created design should serve both functional and aesthetical purposes. Furthermore, the researcher agrees with Dzier (2006), who states that Textile designing is the creation of stylish and contemporary designs. Again, it requires special skills to create innovative designs. The researchers are of the view that the understanding derived from these authorities will assist in the creation of challenging fabric designs that will serve both aesthetical and functional purposes for upholstery fabrics. Upholstery fabric is a tightly woven fabric. The thread count is more and it wears better. It does not wiggle or moves around. It is often heavy. It is tough, durable and does not spoil or fade. It is sometimes also known as home furnishings or decorator fabric and is usually 54 inches wide. Upholstery fabric usually has a balanced weave, where all the yarns are about the same size and strength. A twill weave upholstery fabric resists wear and shows soil less than a plain weave of similar quality (Upholstery fabric, 2009). Newman

(2009) also attests that Jacquard fabrics tend to be rather expensive, but the designs created in the fabric won't fade or wear out as easily as printed designs. Because the back of some of these fabrics often exposes quite a bit of the thread used in the weave, they should be backed or used in situations where the back of the fabric will not be exposed. This type of weave is very popular for upholstery fabric, and most true tapestries are made in this manner. The production of upholstery fabrics can be traced since the discovery of man when animal skins were used to upholster furniture. Upholstery fabric production used to be hand-woven but is now mechanized to satisfy the demand of mass production. But in choosing upholstery, the choice of hand-woven and machine-made depends on the individual. The yarns for upholstery as explained can be natural or synthetic but it is understood that the use of blends (which explains yarns from natural and synthetic put together) will give a durable fabric for furniture. According to the review, cotton fibre dominates the natural yarns used for upholstery. Other fibres like polyester, nylon among others are also employed for upholstery.

Again, it is emphasized that the fabric selected for the upholstery has a great impact on the final appearance, comfort and durability of the furniture piece. Colour and design play a large part in the decision making but it is equally important to consider the fibre content, weave structure and any surface treatment. Upholstery fabric weaves as deduced from the review can be flat or pile. The flatweaves are the basic weaves such as plain, twill, satin and sateen weaves whilst the pile are explained as the complex weaves like velvet, plush, corduroy among others. These weaves can be plain and decorative but their appearances depend on the order of interlacing. Jacquard patterns, when carefully analyzed, may be seen to contain combinations of plain, twill, and satin weaves, even in the same crosswise yarn (Jacquard, 2011). This explains that the use of the broadloom to weave upholstery fabric designs is practicable because the complex weaves produced by machines are just the combinations of the basic weaves and tapestry effect. A major advantage of the Jacquard machine is its ability to selectively pick individual yarns to create images in fabrics and this is a limitation with shaft looms which the Traditional loom is not an exception. Alternatively, the researchers are of the view that yarns dyed using table dyeing can create different illusions that could be used in combination with basic weaves to design upholstery fabrics that are practically feasible with the traditional loom.

However, the nature of the weave structure and its effects depend on the purpose of the fabric. Whether the woven fabric design is loose, tight, decorative, artistic, charming among others, the main objective of designing and producing upholstery fabrics is the ability to balance the aesthetic and functional aspects of the fabric. The objective of the researchers to produce hand-woven upholstery fabric designs was not after aesthetics and functions but to communicate their understanding of weaving as a practice to the general public as attested by Spirkin (2011) who states that, like philosophy, art also has a profoundly communicative function. Through it, people communicate to one another their feelings, their most intimate and infinitely varied and poignant thoughts. Upholstery fabric can balance the aesthetic and functional aspects of the fabric. Furthermore, the researchers in their quest to produce hand-woven upholstery fabric designs were not after aesthetics and functions but to communicate their understanding of weaving as a practice to the general public as attested by Spirkin (2011) who states that, like philosophy, art also has a profoundly communicative function. Through it, people communicate to one another their feelings, their most intimate and infinitely varied and poignant thoughts. Textile designers plan and develop patterns, knit and weave construction, prints, textures and illustrations for fabrics and other materials that require the development of patterned surfaces. They plan the way a fabric looks and performs. They design the structure of the fabric and make decisions about appropriate yarns, colour use, surface patterning, texture and finishing (What is Textile Design, 2010). Textile designers develop fabrics used in furniture, soft furnishings, clothing, vehicles and products such as luggage. They can apply the same skills to the development of patterns for wallpapers, laminates and patterned plastics. They design fabrics to satisfy marketing and manufacturing requirements. They balance aesthetic and functional aspects; they consider the nature of yarn types, thicknesses, weights and textures to produce fabrics to cost and production constraints. This source concludes that textile designers advise and liaise with others who work in industries where it is necessary to predict future colour trends. They monitor trends in industries such as interior design, automotive design and fashion and progressively evolve fabric styles to meet these specific needs (Textile Design, 2009). The review of 'design' exposes and explains the conceptual application of the word in various fields of study. From (Design and Art, 2009) a created design should serve both functional and aesthetical purposes. Furthermore, the researchers agree with Dzier (2006), who states that Textile designing is the creation of stylish and contemporary designs. Again, it requires special skills to create innovative designs. The researchers are of the view that the understanding derived from these authorities will assist in the creation of challenging fabric designs that will serve both aesthetical and functional purposes for upholstery fabrics. In textiles, fabrics are manufactured in wide varieties and designs. And different designs and effects are produced on fabric with various mechanisms which are helpful to form different weaves and lots of design that enhances the look of apparel. Weaving is one of the various mechanisms of fabric manufacturing and another conceptual term of the study that needs to be discussed. Tortora and Merkel (2005) define weaving as the method or process of interlacing two or more sets of yarns or similar materials so that they cross each other at usually right angles to produce woven fabric. It further explains it is the act of causing two systems of yarn, warp and filling, to interlace. This may be done on power or handloom or by several manual methods. Weaving is textile art in which two distinct sets of yarns or threads, called the warp and the filling or weft (older woof), are interlaced with each other to form a fabric or cloth. The warp threads run lengthways of the piece of cloth, and the weft runs across from side to side. Cloth is woven on a loom, a device for Holding the warp threads in place while the filling threads are woven through them. The weft is an old English word meaning 'that which is woven'.

It concludes that weaving in general involves the interlacing of two sets of threads at right angles to each other: the warp and the weft (Weaving, 2010). The basic concept of fabric weaving explains the use of two sets of yarns namely warp yarns and weft yarns. The warp yarns are aligned parallel and run lengthwise in the fabric with tension for easy shedding. However, the weft yarns are used to interlace the warp crosswise at the right angle in a certain order which

defines the character of the fabric. About the sets of yarns, tenacity should be Wiley (2006) observes that the Romans placed special emphasis on combining beauty and comfort, and home interiors reflected wealth and status.

1.1. Materials and Methods

The most significant materials used for the production of the Upholstery were mainly different types of coloured rayon yarns, dyed cotton yarns, embroidery threads and leather material. These materials pose different physical appearances, counts, and twists. These composite textile materials were chosen because of their uniqueness in texture, handle and tensile strengths among others were used for plain and twill weave structures. Moreover, they also added some textural effects as far as the aesthetical value was concerned especially the obtained by the Ikat. Other equipment used was Traditional loom and their accessories. The leather material and the Ikat technique were found most appropriate to be woven manually into plain and twill weave structures, which formed unique surface designs. The traditional loom was chosen for this project because the researchers sought to obtain the unique features of Ghanaian kente fabric design. These items were used in different ways to suit the materials and techniques employed for the creation of innovative upholstery designs.

As Practice-based research, the study aims to advance knowledge partly utilizing practice. This type of research is an original investigation undertaken to gain knowledge and understanding. It includes the invention of ideas, images, performances, and artefacts including design, where these lead to new or substantially improved insights in the field of practice. Moreover, practice-based research is also research where some of the resulting knowledge is embodied in the artefacts. Whilst the significance and context of that knowledge are described in words, a full understanding of it can only be obtained concerning the artefact itself (Candy, 2010). As practice-based research, the project was conducted in the weaving studio of the Department of Textile Design and Technology, Takoradi Technical University. The production processes and the invention of ideas and explorations of the woven samples were executed solely in the studio which includes the following:

1.2. Preparation of Warp Yarns

The project began by arranging yarns in long parallel lengths of equal tension onto a beam. During the warping processes, cones of yarn were placed onto a rack called a creel. From the creel, yarn passes through tension and spacing devices and through a leasing reed which separates the yarn threads and keeps them in the correct order before being wound onto a warping balloon. When the correct amount of yarn was added, the warp was removed from the balloon and transferred onto a warping beam ready for the weaving process, as seen in figure 1.



Figure 1: Warp Laying

1.3. Yarn Dyeing

After warp preparation, the warped yarns were spread on a cemented floor lengthwise. With concentrated Vat dye solutions of assorted colours prepared, a plastic spoon was used to spread the dye pre mix sparingly over the laid yarns on the floor as seen in figures 2 and 3



Figure 2: Warp Yarn on the Ground



Figure 3: Application of Dyes

The warp yarns were kept in an open space till the dyes were exhausted in them. The dyed yarns were dried under shade as seen in figures 4 and 5.

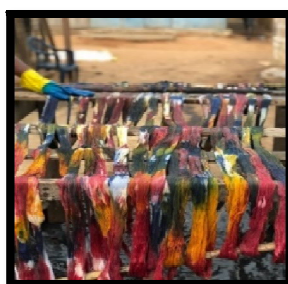


Figure 4: Dye Exhaustion

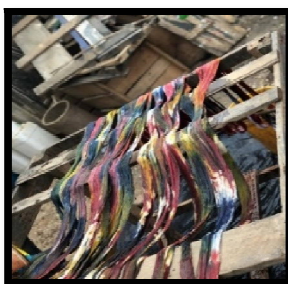
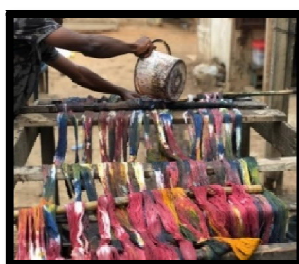


Figure 5: Drying under the Shade

After drying, the dyed yarn was washed to remove excess dyes and dried again before it was removed for other processes to follow, as seen in figures 6, 7 and 8.



*Figure 6: Washing Off
Excess Dyes*



Figure 7: Drying of Yarns

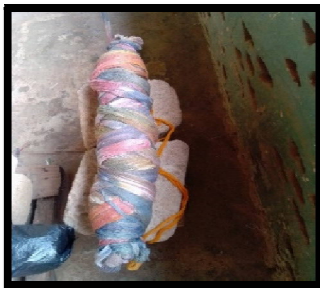


Figure 8: Warp Beam

1.4. Heddling

This process involves passing the warp threads through the eyes of the healds. The warp yarns were picked in doubles and inserted through the eyes of the healds. Heddling is the threading of the warp yarns through the eyes of the healds according to a design and its draft pattern. During heddling, every thread was made to pass through one healds eye. Heddling order is the way and manner the warp yarns are drawn through the healds eyes that give the fabric peculiar characteristics. The processes of heddling are seen in figure 9.

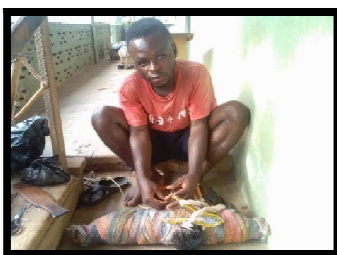


Figure 9: Heddling Process

1.5. Reeding

It is the passing of warp yarns through the dents of the reed. Reeding is done with the reed hook. The yarns were drawn through the dents according to the nature of the fabric one intends to produce. Whether light or heavy. Therefore, the ends could be one, two, three or four in a single dent due to the nature of fabric or pattern one intends to produce. Reeding also accounts for the fabric size in terms of the width of the fabric. The process of reading is seen in figure 10.



Figure 10: Reeding Process

1.6. Tying of Ends to Waist Beam

After reeding, the ends were tied to the flyer rod which was connected to the cloth roller. During tying the ends to the waist beam, equal tension was ensured in all the warp spread, as seen in figure 11.



Figure 11: Tying of Warp Ends to Waist Beam

This is the winding of yarns packaged in form of cones and hanks onto bobbins for picking. In weft preparation, the weaver prepares the colour of yarns intended for the woven cloth to match the warp combination, as seen in figure 33.



Figure 12: Preparation of Weft Thread

1.7. Weaving Order

Weaving is the interlacing of warp and weft yarns to form a fabric. Weaving order is the way and manner a weaver depresses various pedals to give a variety of patterns or effects in the fabric. Weaving order is always deduced from heddlng order, as seen in figure 13 as the actual weaving.



Figure 13: Actual Weaving

1.8. Striped Woven Fabrics

To weave fabric in strips, a tape measure was used to measure the length of each design in 5.5 inches. this was repeated 12 times which made a whole length of tone strip that measured 66 inches for two yards. Seven of these striped woven fabrics were joined to make 2 yards of woven fabric, as seen in figure 14.

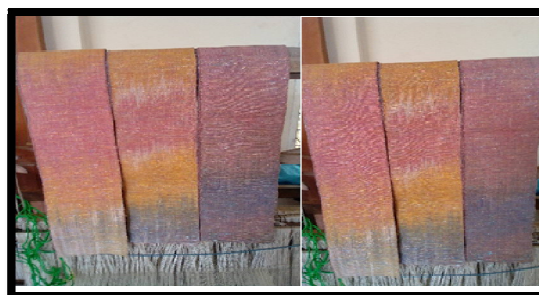


Figure 14: Woven Ikat Fabric in Strips

1.8.1 Cutting and Joining of Strips

After weaving into long strips. The striped woven fabrics were joined into two yards each with the help of a sewing machine in a zigzag stitch. Every seven strips that were joined made two yards of cloth because of the size of the reed used as seen in Figures 15 and 16.

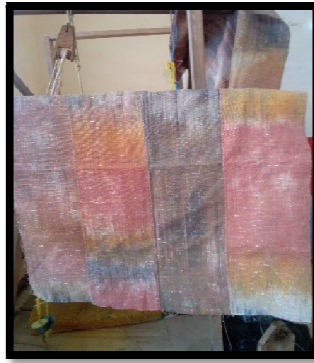


Figure 15: Joined Woven Strips



Figure 16: Joining of Woven Strips

Final woven ikat fabric with the name my last born [Kaakyire], as seen in figure 17



Figure 17: Final Woven Ikat Fabric

1.9. The Design Processes

The same weaving processes were followed to weave a different kente fabric on the Traditional loom with geometrical designs in them as in figure 19. This was measured and cut into 15 inches width and 16 inches by length using a measuring tape. The woven fabrics were ironed to remove all wrinkles to make them smooth, as seen in figure 18.



Figure 18: An Ironed and Stitched Woven Fabrics

The same size of stiff material was placed underneath the woven fabric on the shiny side of the stiffener, heated to hold the fabric together. This increased the weight of the kente fabric to withstand the machine embroidery operation, as seen in figure 19.

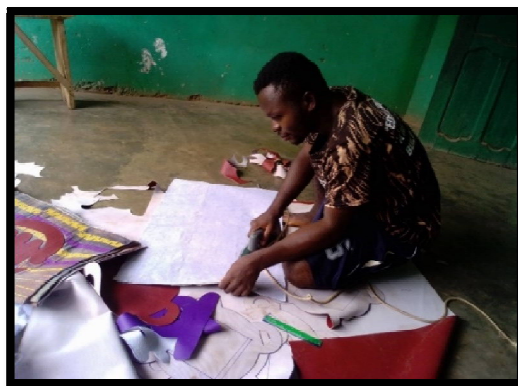


Figure 19: Ironing of Fabric with Stiffener

Several adinkra symbols were modified and transferred onto artificial leather for embellishment. The name of these symbols was; 'Bese Saka', Gye Nyame, Adinkra and Golden Stool as seen in figures 20, 21, 22, 23, 24 and 25.



Figure 20: An Adinkra Symbol 'Bese Saka'



Figure 21: New Design from 'Bese Saka'



Figure 22: Gye Nyame

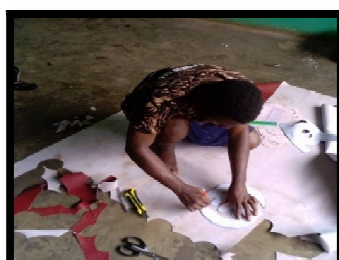


Figure 23: Tracing of Design

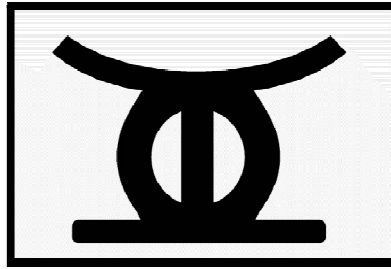


Figure 24: Adinkra Golden Stool

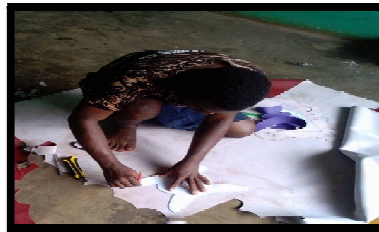


Figure 25: Tracing of Design

The various twill weave structures such as straight twill, diamond twill, and pointed twill were woven on the leather by interlacing the red leather as weft across the green leather as warp, as seen in figure 27 and 28.



Figure 26: Weaving on Leather

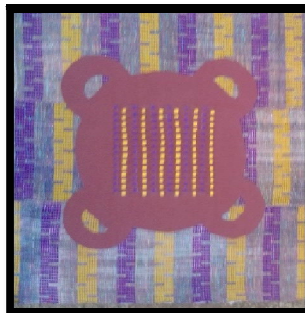


Figure 27: Woven Leather Design

After weaving, an adhesive was used to secure the selvages to avoid the weft from fraying. A stiff was also used to hold them to place as seen in figure 28.



Figure 28: Application of Adhesive to Selvages

After securing the selvages, adhesive was applied to the backside of the leather was dry. This was later attached to the middle of the woven kente fabric at both sides (front and back), as seen in figure 29.



Figure 29: Fixing of Leather to the Kente Fabric

1.9.1. Embroidery Processes

Embroidery is the technique by which thread and needle are used to decorate fabrics, leathers, and other articles. Embroidery is done by either hand or machine. Embroidery stitches include running stitches, lazy daisy stitches, satin stitches, back stitches whip stitches and many more.

In this project, the kente and the leather fabric were placed on the throat plate of the embroidery machine. The needle was positioned on the right side of the leather and a satin stitch was used to traced the outline of the leatherette to joined the kente and leather material together and this, in turn, decorated the leather to form part of the kente, as seen in figure 30 and 31.



Figure 30: Embroidery on the Leather



Figure 31: Embroidered Fabric

1.9.2. Sofa Refurbishing Process

Based on the data collected from the field, it was observed that the kente fabric to be used must be heavy or of a close weave structure. Therefore, the researchers enquired from the market to find out the best yarn that can meet this demand. As expected weavers, the researchers put together a combination of yarns to weave kente fabric on a traditional loom to be used for Upholstery.

The processes involved in sofa refurbishing includes the following:

- The individual parts of the sofa were disorganized, as seen in figure 32.



Figure 32: Dismantling Individual Parts

- The old leather was removed from the seat, back, base and handle by taking off the sewing threads used in joining the pieces of leather together with the help of a knife, as seen in figure 33.



Figure 33: Removal of Old Leather

- The foam used on the wooden frame was removed leaving the wooden frame naked, as seen in figure 34.



Figure 34: Removed Foam and Wooden Frame

- The removed leather parts were placed on the woven fabric to trace their patterns to get an accurate measurement and were cut out, as seen in figure 35.



Figure 35: Tracing and Cutting of Patterns from the Fabric

- The woven fabric was placed on the leather to add weight before sewing onto the fabric. Individual patterns were sewn and joined together to get the seat, back, handle and the entire body, as seen in figure 36.

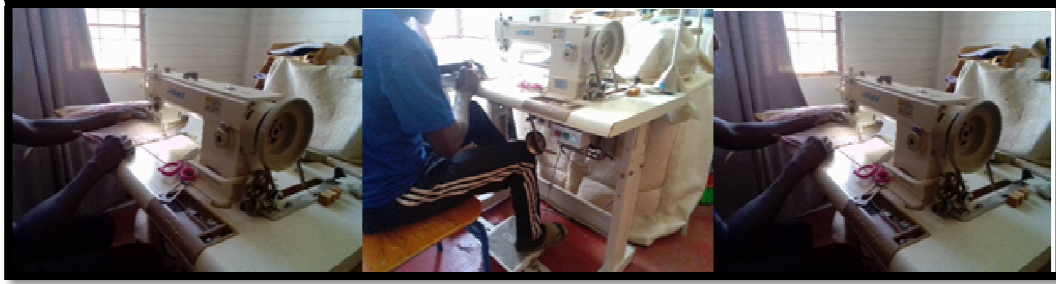


Figure 36: Joining Patterns

- After seeing the patterns, adhesive was used to combine the foam and fabric to make it stable to be attached to the wooden frame. The foam was added to the handle to increase its strength of it, as seen in figure 37.



Figure 37: Attachment of Foam And Fabric

- The foam and fabric joined together were put around the wooden frames and positioned well, making sure all sides were balanced, as seen in figure 38.



Figure 38: Fixed Foam and Fabric on Wooden Frames

- The fabric was stretched by pulling various joints and sides with the help of a staple gun to put the parts in place, as seen in figure 39.



Figure 39: Stretched Fabrics on Frames

- The back fabric was fixed and a drilling machine was used to drag bolts to attach the back to the base and seat of the Sofa. The crafted wood was fixed to the base frame in front of the seat to cover the pins and cut areas. Finally, taffeta fabric was used to cover the base to avoid the mouse entering into the sofa that can damage the fabrics and foams, as seen in figure 40.



Figure 40: Insertion of the Back, Craft Wood and Covering the Base with Taffeta Fabric

The outcome of the refurbished sofa, as seen in figure 41.



Figure 41: Final Upholstery Designs

The final design is displayed at the IPELO office at Takoradi Technical University, as seen in figure 42.



Figure 42: Final Design in Display

2. Result and Discussion

This section provides the presentation and discussion of the design of the final product, considering the suitability of Ikat, woven leather, embroidery stitches and woven kente in the production of Upholstery. The combination of these materials and techniques for the project resulted in an amazing upholstery design. The discussion of the result is focused on the aesthetic qualities concerning the respective construction techniques and the suitability of Ikat techniques, embroidery technique, woven kente and leather fabric designs for interior furniture. The method used in creating plain and twill weave structures with Ikat(yarn dyed) and woven kente fabric were ascertained by heddling and stepping order. Tie-up arrangements determined were responsible for the outcome of the twill weave structures in the fabrics. Also, the aesthetic effects produced were a result of the leather type, yarn type, dyeing techniques, handpicking techniques, and embroidery stitches.

2.1. Refurbished Upholstery



Figure 43: Refurbished Upholstery

The combinations of a plain weave, twill weave, leather weave, kente weave and embroidery stitches were used to create these artefacts. The aesthetical appearance of the upholstery materials was considered, however, the functional aspect of the product was of prior importance. Considering the basic weaves, the plain weave was considered to be the strongest and most durable. Mabey (2010) affirms that plain weave is very strong, versatile, and appropriate for many different fibres and blends of fibres. The Twill weave design was introduced to add beauty and a taste of tradition to the Artifacts. The plain weave was used as a binder to make the fabric compact to suit their functional purposes and aesthetically enhance the fabric. These products are suitable for Sitting rooms, Kings and Queens Palaces because of the materials used in their production.

The concept of colour and weave effect was employed in producing the upholstery. The novelty in the design was the textural and pattern effects achieved as a result of using different materials. The distribution of colour in the product made them physically appealing.

2.2. Main Findings

The upholstery market was observed, upholstery sellers and furniture producers were interviewed to access information on the suitability and qualities of upholstery fabric designs. It was observed that dyed and woven yarn (Ikat), woven kente, and woven leather fabric could be used in making upholstery that could be embellished with embroidery. The researchers employed an observational guide and interviewed upholstery merchandisers, furniture producers, and fabric structure experts respectively.

2.3. Conclusions

The first craft of man to cover his nakedness runs through every culture in all countries. Today, the main objective of using fabric has extended to various end uses, including furniture covers. The art of hand-weaving in every tradition gives a unique identity and relatively portrays the philosophical meanings of the lives and beliefs of the people. Hand-woven fabrics have their own unique aesthetical and functional values that differentiate them from machine-woven fabrics. According to Katherine (2010), hand-weaving is a relic for museums, crafts fairs, and people in search of something special. Hand-woven upholstery fabrics revealed by the study can be used for furnishing furniture. Significantly, more emphasis should be placed on the type of yarn and the weave structure. These should be strong to withstand the varying pressures and abrasions that the furniture would be subjected to. The colours of the fabrics play a major role in determining the buying and selling of the fabrics. Weavers should concentrate on dark colours rather than light colours because of the dusty nature of the environment. the durability of upholstery fabrics whether hand-woven or machine-woven depends on the type of yarn, weave structure, and most of all, the rate and the kind of exposure that the furniture is exposed to.

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