

Ghanaian Indigenous Tanned Leather; An Architectural Decorative Material For Interior Ceiling

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Abstract: Ghana abounds with numerous natural raw materials, technologies and design concepts, however, these have not been sufficiently harnessed to meet the needs of contemporary society in the decoration of interior ceiling. Exploiting these opportunities means looking beyond traditional applications for alternative ones that could bring about job creation, revenue generation to boost the national economy. The production and use of leather items in Ghana have not seen much improvement although many indigenes and foreign visitors show some level of interest in these articles. The items are mostly repetitive in design and production, as a result, the benefit accrued from the industry is limited and has no extensive effect on the economy of leatherworkers and the nation, compared to what other nations such as India, Egypt and Nigeria are benefiting both domestically and for export. In an effort to boost the value of Ghanaian indigenous tanned leather the researchers used the qualitative research method where observational, descriptive and studio practiced were applied to experiment on the production of vegetable tanned leather tiles suitable for decorating interior ceilings. Currently many Ghanaians have developed interest in the use of ecologically friendly materials, hence, the successful experimentation of this ecologically friendly materials, combined with an innovative local technology and design concept has proven that vegetable tanned leather tiles can be produced for decorating interior ceiling. The research creates an avenue for researchers and leatherworkers to explore other possible uses of this adaptable material which would be a major booster for the Ghanaian leather industry and provide many people with new and flourishing sources of income.

Keywords: Interior Ceiling, Tiles, Vegetable tanned leather, Decoration. Ecological

I. INTRODUCTION

The use of animal skin and hides, as useful materials have been with mankind for thousands of years (The Leathersellers Company 2016). The early man's discovery of animal skin as a resourceful clothing material essential to protect himself against the incriminating weather conditions kindled frantic efforts to improve on the means of preserving it. Leather Resource (2008), opine that, Leather tanning is one of the earliest mankind's activities, and that early man found that different treatments applied to the pelts (raw skins and hides)

contributed to halting decomposition through bacterial activities on the by-product of their food source. Beyond clothing, animal hide and skin, treated with plant extracts, create more comfortable warmer bedding, was used to provide shelter as well as seating and other acceptable uses and these have been so as a result of leather's physical properties that influenced its use in diverse productive ways. Atiase (2004) states that leather is known to possess 'desirable properties' which makes it pliable, durable, and versatile in utility. Further on, Boahin (2008), have stated vegetable tanned leather is adaptable in utility because of its different

properties, for example, workability, magnificence, stretch, adaptability as fabric or as hardened as wood and sometimes thick and overwhelming. The early realization of the potentiality of leather as a material that can be manipulated to produced variety of items to meet societal needs, influenced the discovery of advanced technology that have enabled them to increase the diversified uses of leather and among these is the use of leather for interior ceiling decoration in the form of tiles.

Commenting on the leather industry in Ghana Larbi (2009), has stated emphatically that over a century of practicing leatherwork in the country has not brought about any drastic change to show improvement on the vocation as done elsewhere across the globe. The skills and techniques which had persisted as before allow tanners portray it as their inherited pattern of producing articles and are not willing to change or enhance these technical abilities. The techniques, instruments, materials and working environment have all remained as before for that number of years, this has brought about low patronage and limited variety in production. Corroborating on this statement, Mokhothu-Ogolla and Wanjau, (2013), explains that, in most emerging nations, tanning operations is privately-run establishments, executed in minor to medium scale semi-motorized units, commonly assembled tightly in clusters outside residential locations'. The industry lack the form of advancement identified with the advanced countries, and as such the nation is not benefiting from the immense socio-economic opportunities associated with leather, as an abundant local raw material.

In countries like Kenya so much emphasis is laid on value addition, with the belief that such means would help boot the industry as a major source of income. According to National Economic Council of Kenya (2010), the hide and skin industry in Kenya is one of the key agricultural subsectors that can contribute to achieving economic growth through expansion of export market of both semi-processed and finished leather goods. In the light of this frantic measures have since been put in place, example is the establishment of the Leather Development Council (LCD). Mwinyihija (2009), have also stated that, the contribution of Kenya's agriculture sub division towards accomplishing financial development through an improvement of the export market for both semi-finished and completed leather products is tremendous and that the best way to such achievements is through embracing quality improved endeavour'. As indicated by him, 'this is the path that the ministry has espoused and unequivocally seeks after to take care of the business' demand'. Technologies can change the current states of traditional leather industry, which will likewise guarantee the acknowledgment of reasonable improvement of the leather industry (Mokhothu-Ogolla and Wanjau, 2013).

The researchers are of the view that the introduction of practical measures towards enhancing the use of indigenous vegetable tanned leather in the production of modern items would further improve the value of Ghanaian vegetable tanned leather at both local and international markets; thus the successful experimentation on production of ceiling tiles with indigenous vegetable leather would be a major stride in the Ghanaian leather industry. The production of ceiling tiles that are ecological friendly and locally available would enhance

the value of indigenous leather industry in Ghana. Boahin, Adu-Agyem, Peligah (2011) asserted the need to explore existing local materials and technologies to improve upon them to meet contemporary needs for national development. Broadening the use of Ghanaian indigenous vegetable tanned leather for the production of ceiling tiles would lead to increase in job opportunities in production and marketing. The benefits of using vegetable tanned leather is immense as indicated by Jim Carfrae (2011). That, using natural materials as a part of a building give a healthy interior environment with an altogether better indoor air quality, that, the off-gassing of VOCs (volatile organic compounds) that can come about because of the application of uPVC and Vinyl finishes is avoided.

Ceilings as an architectural feature, form a basic part of an interior decoration; that it conceals the underside of the roof and it improves the aesthetic qualities, absorbs excess humidity and controls the temperature of a room (Wikipedia 2016), the "Ceiling" (2008) also simplifies the definition of ceiling as the overhead surface of a room, opposite the floor. However, ceiling decoration comes in diverse forms and techniques and among these are tiles. The Encyclopedia Britannica, (2011), define tile as a flat, slab, or blocks used structurally or decoratively in buildings. This is corroborated by Merriam-Webster (2016), which also define tile usually as a flat piece of hard clay, stone, or other material that is used for covering walls, floors, etc. Encarta states that, in antiquated Egyptian temples the underside of the plane of flat stone rooftop was by and large painted blue with yellow stars, groups of symbolic representations, and tokens of the sky and that in Greek temples the pitched timber rooftop was once in a while covered up or left revealed and in some cases covered up by a coffered (profoundly framed) roof, regularly beautifully painted. (Ceiling 2008).

According to Wikipedia (2016), Ceiling tiles are lightweight tiles used inside buildings. On materials for fabricating ceiling tile the online dictionary states that Mineral fiber tiles are manufactured from a range of items; wet felt tiles can be fabricated from perlite, mineral wool, and fibers from reused paper; stone wool tiles are made by joining liquid stone and covers which is then spun to make the tile; gypsum tiles depend on the soft mineral and afterward completed with vinyl, paper or a decorative face (Wikipedia 2016). As part of the making the interior of a building aesthetically pleasing the interior decoration should also be put into consideration.

Dilating on the concept of architecture Adu-Gyamfi, Boahin and Padditey (2013), states that architecture has to do with the arranging, outlining and developing structures, space and mood that reflect utilitarian, specialized, social, ecological, and aesthetic contemplations; that, architecture requires the inventive control and coordination of material and technology; such twin elements can be identified with the use of indigenous tanned leather. Vitruvius (2011), states that, a decent building ought to fulfill these three standards; toughness (a building ought to stand up vigorously and stay in great condition), utility (it ought to suit the reason for which it was made), magnificence (it ought to be aesthetically satisfying). The three identified principles fine their expression in (the are characteristics of) leather, it, it is an incredible natural medium which can be cut, formed, coloured,

tooled, decorated, squeezed, interlaced, engraved, sewn, blazed, painted, recolored and a great deal more. It can be made by anyone. eBay (2009) has it that there are various sorts of hides and skins, in addition to various treatments and procedures for tanning these hides into leather and numerous finishing techniques applied by skilled master craftsmen to design the leather in varied products. The efforts in value added to enhance the use of Ghanaian indigenous leather industry through its adaption as architectural material is an innovative addition to local raw materials that could be relied upon in the building industry.

According to Beukers and Hinte, (2001); Manzini, (1989). Material innovations have been part of long term debate about any part of architectural history. The discovery of new materials or new applications for existing materials has served to change ideas of materiality from massive to always ethereal and transient developments. The use of Ghanaian indigenous tanned leather for its properties for architectural purposes would be a boost in reliance on local available raw material. Kieran and Timberlake (2004), opine that dramatic changes in the properties of as of late created materials will at last change design... Beyond the fascination with new materials lies a universe of intentional frame yet to be investigated, a world in which materials will be chosen based upon properties applicable to use.

II. METHODS

To alleviate this impeding situation where the production of leather goods is limited to only traditional items as stated earlier, the researchers have taken on studio research to experiment on indigenous vegetable tanned leather for the production of interior ceiling tiles. This required the use of materials such as: synthetic-glue, strawboard and indigenous vegetable tanned leather. Leather's mouldability, tensile strength and decorative ability as indicated by Harader (2008), and Muirhead (2015), were relied upon and tested to ascertain the competence of the locally tanned leather as an alternative material for the production of tiles suitable for decorating interior ceiling; howbeit, the iterative design process was employed to produce prototypes prior to the final production. The researcher used the purposive sampling technique in identifying and selecting quality leathers and other materials for the study. Beside the researcher used the secondary data collection method to identify the general characteristics and properties of leather that make it viable for use in the project; observational and descriptive approaches were employed to assess and document the various stages of the research-outcome.

In pursuance of the research the preliminary sketches were made as follows.

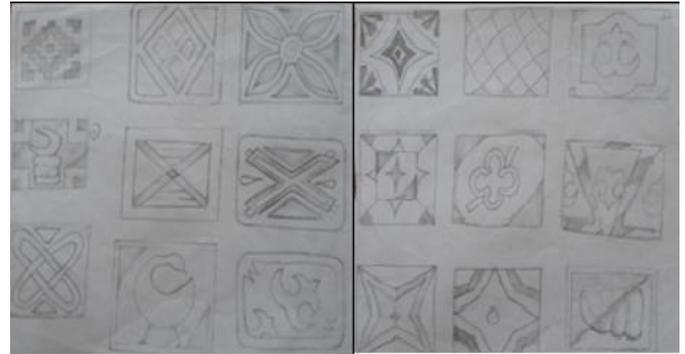


Figure 1: Thumbnail sketches)

DETAILS OF SKETCHES:

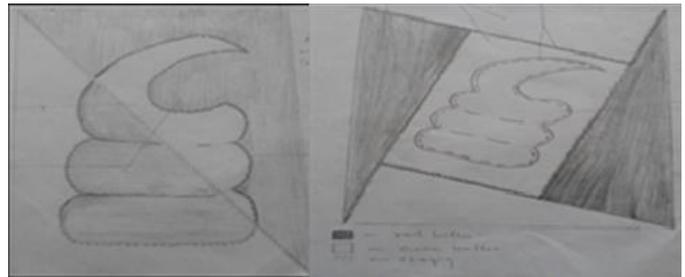


Figure 2: akoben motif

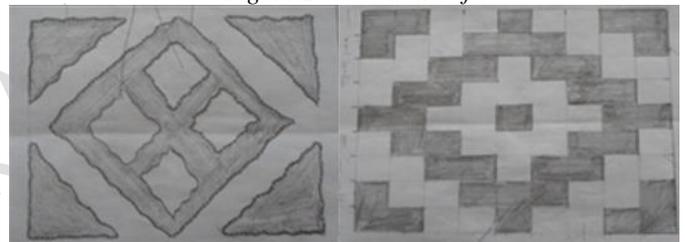


Figure 3: Eban motif

PAIRING OF DESIGNS

The different motifs were paired and organized in the following illustration

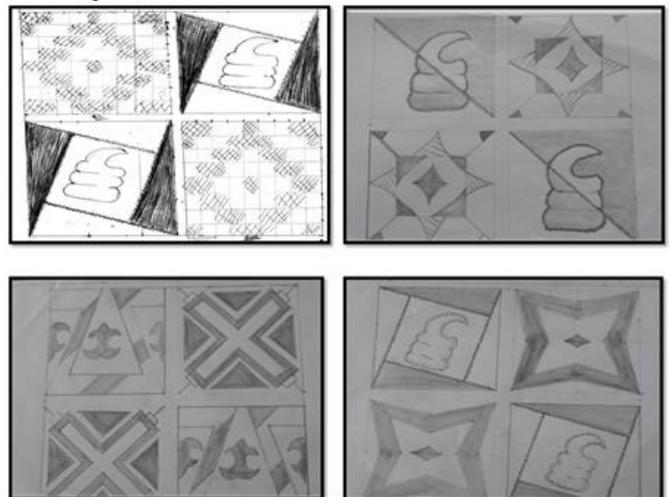


Figure 4: Pencil sketch of organized motifs

DIGITAL RENDITION OF DESIGN

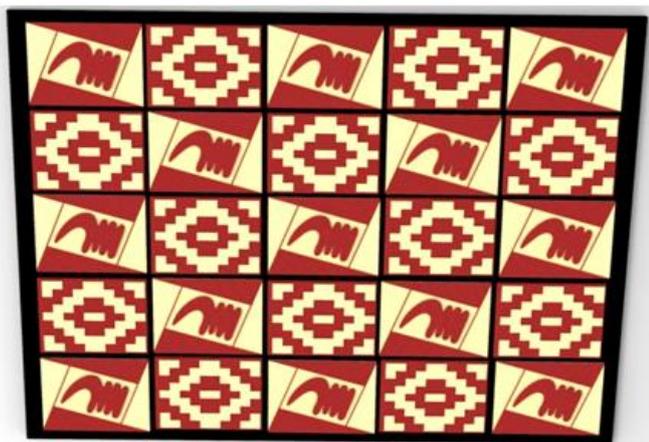


Plate 5: Rhinoceros Rendition of organized of design

THE RESEARCHER MADE THE FOLLOWING PROTOTYPES



Plate 6: Paper Prototype



Plate 7: Locally tanned leather Prototype

SECONDARY PREPARATION OF LEATHER



Plate 8: Tanned leather



Plate 9: Sanding on flesh side of leather



Plate 10: (Soaking)



Plate 11: (Stretching and Tacking of leather)

DRYING OF LEATHER



Plate 12: (drying of the cream and red leathers)

PUNCHING AND THONGING OF PARTS TOGETHER



Plate 17: (Punching and thonging of Akoben Patterns)

EXECUTION OF THE WOVEN DESIGN



Plate 13: (Cutting the gridlines)



Plate 14: (Gluing the weft)

REINFORCING THE BACK OF THE TILES



Plate 18: Gluing and pressing the edges



Plate 19: (Back of reinforced tile)



Plate 15: (Flattening the surface of woven design and Reinforcing with strawboard)

SPRAYING AND MOUNTING OF TILES



Plate 20: Spraying of tile

MARKING AND CUTTING OF TEMPLATE AND LEATHER



Plate 16: (Marking of Akoben template and pasting on leather)



Plate 21: Mounting of tiles

FINAL WORK



Plate 22: (final execution of the actual work)

III. DISCUSSION OF RESULTS

The use of Vegetable tanned leather as a natural architectural material does not impact negatively on the environment as compared to plastic based architectural materials used for decorating ceilings, most of these have to be replaced over a period of time. Careful determination of ecologically practical building materials is the least demanding path for architects to start joining maintainable design principles in buildings (Kim and Rigdon1998). Most Ghanaian indigenous leatherworkers are ignorant about the potential use of locally tanned leather for the production for the production of ceiling tiles, hence their continuous reliance on the production of traditionally known items as inherited from previous generations.

The researchers' efforts at expanding the uses of Ghanaian indigenous tanned leather proved successful, the identified unique properties of leather enabled them to be manipulated for the production tiles that could be used for decorating interior ceiling. The notable properties of leather relied on for the project includes the following; its tensile

strength - it resists tearing, flexing, puncturing and cracking, mouldability, easy decorative ability. Thermostatic property – this make it warm in the coldest season and cool in the warmest season of the year, Harader (2008), states that, it is a decent heat obstruction and gives superb heat protection, that it contains a lot of air and air is a poor conductor of heat, this makes leather an extremely comfortable product to use resistance to putrefaction, permeability to water vapor and resistance to chemical attack in addition to its easy accessibility.

Many artificial ceiling materials emit toxic fume when exposed to excess heat or fire, and may also flakes with age which make it unhealthy to use particularly sufferers of asthma and other allergies, however, Harader (2008), have stated that, leather is fire resistant and emits no toxic fumes even when exposed to intense heat. The pliability of leathers used makes it more useful as compared to other materials used for ceiling decoration, these are often rigid and breakable. Considering the pliability of the indigenous tanned leathers the researchers reinforcing it with strawboard this improved upon its firmness and attained the thickness or stiffness required. The fibrous nature of the grain side of leather made it easy for the use of either water or synthetic based glue, the researchers chose to use the shoe-makers glue which is synthetic based, due to its covalent bond nature that it demonstrates on locally tanned leather to improve upon its fixability and compactness.

Finishing an artwork which is the last stage and final treatment given to improve upon its aesthetics and functionality is very vital so the researchers identified two common finishing techniques used by local leatherworkers, these were spray lacquering and wax polishing, the former was chosen since it worked best on locally tanned leather and is easily available, its application on the finally finished work proved its worth and made brushing of dirt much easier. The natural colour of the leather tiles gave the ceiling a vintage feel, full of rhythm and a pleasing sense of uniformity to the entire space it occupied. The use of traditional motifs provides a sense of satisfaction, identity, belongingness and an enhanced interior decoration.

The mounting of finished tiles marks an important milestone in decorating ceiling in Ghana. The researchers chosen procedure was by first fixing a painted plywood upon which the leather tiles were assembled and fixed permanently with decorated screw to enhance its aesthetic appeal the tiles are lightweight and would not falloff or slide over. Screws were chosen to make removal easy in event of replacement whenever necessary without causing any extensive damage to the tiles. The reinforced leather tile would not warp and they clean up with the wipe of a sponge, provide aesthetic qualities, absorbs excess humidity and controls the temperature of a room as indicated by Wikipedia (2016), on the features of roofing tiles.

The benefit of using leather as a natural material allays any fear of hazardousness as found with artificial materials as indicated in the following that, Long-term exposure to certain building materials may be hazardous to the health of a building's occupants (Kim and Rigdon1998). Asdrubali (2016), has also stated that natural building materials is better as far as health of occupiers. The successful use of the Ghanaian indigenous tanned leather is an interesting turn on

the lamentation of Larbi (2009), as indicated earlier, where Ghanaian indigenous leatherworkers had not made efforts to improve on the trade. The use of indigenous tanned leather as a decorative material for interior ceiling does not only enhances its value but also provide another source of beauty to the home to satisfy the view of visitors, commenting on this Revedecor (2016), comment in the following; Some may believe that a roof is not seen by the visitors, but rather there are some individuals that jump at the chance to concentrate on the house "from head to toe". Nonetheless, having a delightful ceiling, in line with ones' house, will convey peace to one and the family, since one realizes that his home is as excellent and complete as it could be. Gibson (2012) has also stated that

"Houses often end up with white, featureless ceilings at uniform 8-foot heights, the thought being that they are too far from view to impact the look of a room. In fact, ceilings have unique effect on a home's interior as its walls and floors".

IV. CONCLUSIONS

This study has identified locally tanned leather as an alternative material for the manufacturing of ceiling tiles, this has been so due to the common unique properties associated with both goat and sheep skins that are the most common sources of leathers. Some of these properties include the ability for locally tanned leather to be easily be decorated using varied decorative techniques such as weaving, embossing, appliqué, scotching, painting, thonging and embroidery etc., mouldability property of leather which refers to the ability for locally tanned leather to be pliable, tensile strength which involves the ability for leather to resist strain and stress and thermostatic property which refers to the ability for leather to be able to regulate temperature just to mention a few. Furthermore, locally tanned leather is native to Ghana unlike P.O.P and plastic T&G which are imported thereby creating job avenues for the youth. Due to this qualities and merits of locally tanned leather, it can be concluded that, locally tanned leather can be used as an alternative material for the manufacturing of ceiling tiles. It can be concluded that; locally tanned leather can be used as an alternative material for the manufacturing of ceiling tiles.

V. RECOMMENDATION

The researchers recommend that locally tanned leather should be used in the manufacturing of ceiling tiles. People should be sensitized about the use of locally tanned leather for the production of other materials aside traditional artifacts such footwear and bags. Further researches should be conducted to identify other valuable uses locally tanned leather can offer.

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