

The production and Finishing of the Prototypes of the International traditional narrow strip Fabrics as the basis of Motorizing the Modified floor loom

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Abstract

The aim of this study is to the production and finishing of the prototypes of the international traditional 'Tukurdi' fabrics as the basis of motorizing the modified steel frame floor loom. Nine different samples were woven before getting the exact prototypes of the traditional narrow strip fabrics. Out of the nine samples the last two were selected and dyed through the traditional indigo dyeing methods and the finishing was done using the special traditional calendering techniques. The main objectives of this study were successful, because the mechanised modified loom constructed can weave the prototypes and the traditional process of finishing of the fabrics were successful. The two finished prototype fabrics were a breakthrough in production of the modified loom. . Extra effort need to done on the production process of the modified steel loom in order the get the exact appearance of the traditional veil after the finishing process. Inter disciplinary research of the Industrial Textiles Designers, Mechanical and Electrical Engineers must came together for a proper motorization of the modified steel frame loom for fabric production.

Keywords: Traditional fabrics, Prototypes, Finishing, motorization, Loom production.

INTRODUCTION

There are many schools of thought about Nigeria's technological development. Adetoro (1980) opined that, "development from the grassroots level is more adequate, what is important is for the present Nigeria textiles producers to translate the mechanism of the traditional looms to contemporary types." According to Dutsenwai (2009) "the indigenous Hausa technology of textiles production and services such as indigenous hand spinning, weaving and indigo dyeing have been fatally influenced by modern technology." The use of the modern textiles products had over taken the use of traditional yarns, woven and dyed fabrics because the traditional fabrics are not available. The aim of this study therefore, is to produce the narrow strip fabrics with the modified steel frame loom and follow the traditional methods of finishing the narrow band fabric as a means of producing a fabric that could compete and replace the traditional *Tukurdi* fabric which is fast disappearing.

The objectives of this study are to weave in multiple strips form, multiplying the works of many traditional weavers put together and do the traditional finishing technique of the proto-types of the traditional *Tukurdi* fabric in order to get a suitable modified fabric that can compete with traditional *Tukurdi* fabrics. The transformation of the modified traditional men's horizontal loom from wooden to steel frame modified loom was for the perfection of the modified loom production capacity for motorization. Seven prototype samples were woven before getting the

required samples that number eight and nine of the woven samples resemble the traditional *Tukurdi* strips. The samples were taken to Kura Town in Kano State for traditional indigo dyeing and then later to the special traditional calendering as the final finishing for the *Tukurdi* veil. The dyeing and calendering of the samples were made together with an original *Tukurdi* veil bought at Kura market for comparison with the prototypes. The result was very encouraging as the two fabrics look very much alike, with the prototypes showing the lines of demarcation of the strips.

All the researchers need to do in order to get the breakthrough of producing a fabric that will resemble exactly like the traditional *Tukurdi* veil is to explore another production method that could eliminate the stripes on the *shiny surface* of the prototypes production method. There is need to produce a fabric with the modified loom which will conceal the line of demarcations on the *shiny* part of the woven strips after the final calendering for a proper rescue of the traditional disappearing fabrics. Extra effort need to done on production process of the modified steel loom in order the get the exact appearance of the traditional veil after the finishing process. Inter disciplinary research of the Industrial Textiles Designers, Mechanical and Electrical Engineers must came together for a proper motorization of the modified steel frame loom fabric production.

HISTORICAL BACKGROUND

The Men's Traditional Narrow Horizontal Loom

The horizontal loom in Nigeria, according to Lamb and Holmes (1980), used by men most probably has a northern origin. There is evidence to suggest that cotton spread westward from Nubia on the upper Nile somewhere around the beginning of the Christian era if not earlier, and cotton became associated in sub-Saharan West Africa trade, with the demand for cloth by the desert nomads and by the ability of the peoples living along the Southern edge of the desert to produce the required fabrics." Lamb and Holmes, (1980), also stated that, "In the fourteenth century we know that the rolls or strips of cotton cloth were being used as currency in Borno, (see Plate 1- Waziri, 2015) and by that time the trade link between the weavers and the dyers of the Kano region and the Tuareg and other nomads of the Sahara had been well established.



Plate 1: The narrow strip fabrics

Hausa made weaving was very much on the decline, kept alive by certain highly specialized traditional uses such as the demand for white Sawaye cloth for burial shrouds and other cloth still sought after by the Saharan nomads (Lamb and Holmes, 1980).

The loom is still in use in the northeastern Adamawa State from Yola through Zumo, to Mubi with their counterparts in Cameroun. The Bororo Fulani is another group of people occupying part of the Sahara in Nigeria and Niger, who use *Tukurdi*-like strips in their garments. The young Bororo men of this group place great value on a very simple sleeveless smock made from this material, again of deepest indigo blue. The general zone of the West African and Chadic looms include: northeastern Nigeria, northern Cameroun and southeast Chad”. See Plate 2; for Nigeria.



Plate 2: Nigerian map showing areas of hand weaving. Courtesy Lamb and Holmes (1980)

There are three main features which distinguishes the loom from the neighbouring Hausa loom. First, instead of the single pole, the Chadic loom employs a frame which includes two longitudinal top members across which are hung on a cross-bar, the beater and heddles. The cross-bar is not tied to the frame but is free to move along the longitudinal members very much in the manner of framed looms in other parts of West Africa. This research programme was undertaken as a result of calls and recommendations by some researchers who unanimously agreed that research on indigenous small scale handcrafted textiles would enhance and change their status from traditional to modern small scale textiles centres these researchers include; Adetoro (1980), Ada (1985) and Dutsenwai (1985). Some research studies were conducted on the indigenous textiles like the studies of Renne (2002) and Dutsenwai (2009) but none was specifically focused on the traditional horizontal loom, the works of Shea (1979) and Ada (1985) were well noted.

MATERIALS AND METHOD

MATERIALS

The materials used in this research include the graph paper, marking pen, the steel frame modified loom, the cross sticks, warp frame, the sewing machine thread as warp yarns, the cap hand sewing thread as the selvage and the strip dividing yarns, the hand spun yarns as weft, the shuttle for carrying weft yarn, the hook

for dressing the loom, the scissors for cutting the yarns, office pins for warp adjustments and water for damping the warp yarns so that they will not cut easily during the weaving operation, traditional indigo pit dyeing, traditional calendering, indigo dye pigments and animal fats.

METHOD

The Plain Weave Design

Graph paper was used in the structural textile designing. An attempt is always made to use a graph paper that coincides closely with the planned fabric construction. On this graph paper each square represents the intersection of the warp and the weft yarns. Colouring the squares means one thing and leaving them blank means something else, depending on which part of the plan is being drafted. For the design, a vertical column of squares represents one single warp yarn and a horizontal row of squares represents one single weft yarn. Any one square represents the point at which one warp and one weft interlace. Colouring a square means that the warp end is raised over the weft pick, while a blank square means that the warp end is lowered under the weft pick see Plate 3a.

In the design below Plate 3a, the first square in the lower left corner represents the interlacing between the number one warp yarn and the number one weft yarn. The warping operation was done with measuring the required length of the warp yarn. The warp yarns were wound on warping frame with the formation of a shed as in Plate 3b, to keep the warp threads in order using the cross sticks. The warp yarns were removed from the frame and are tied to the warp beam.

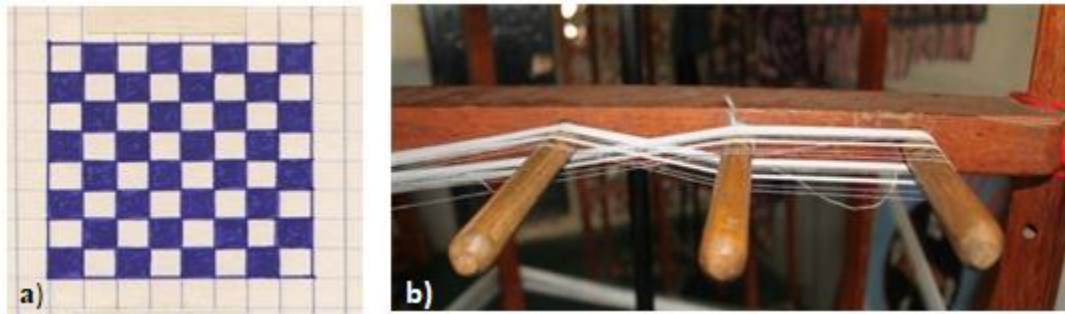


Plate 3, a) Plain weave design, b) Warping to form a shed on the warp frame (Waziri, 2015)

The weaving process itself consists of three basic operations which form a continuous cycle whether in simple hand loom or in the most complex automatic machine. These primary motions are the shed, the pick and the beating up.

- a) The shedding is the separation of the warp yarns into upper and lower layers forming a 'shed' or an opening through which the weft yarns were passed.
- b) The picking is the insertion of the weft yarn through the shed.
- c) The beating up is the carrying forward of the last inserted pick of the weft to the cloth on the beam already woven.

The warp yarns were transferred to the warp beam, the threading of the individual warp yarn into the eye of individual heddle was done with the help of the hook. The warps were sleyed by passing each warp through the dents of the reed which serves as a comb with the help of a hook. When these processes were made, the warps were tied to the cloth beam and then pulled to the

required tension. Then the loom was ready for weaving. The weft yarn was then wound on the shuttle stick and was inserted into the shed as planned by the weaver. For the first weaving operation, the loom used two pedals, and four shafts.

Fabric Weaving on Modified Steel Loom

The weaving process was done with the warps of polyester threads and the demarcations of the strips with cotton machine spun threads while the weft was of traditional hand spun cotton yarns. The joining of the strips was modified so that the woven cloth on the modified loom should look like the already joined strips, putting together the works of many traditional weavers at the same



Plate 4a: Prototype weaving.
Courtesy Bashiru 2018



4b: Prototype 009.
Courtesy Waziri, 2018

piece of cloth. The shuttle carrying the weft yarn was propelled through the shed, which leaves a trail of yarn behind as it passes through the opening shed formed by the warp yarns. The beating-up motion consists of a reed through which the warp yarns were drawn and spaced properly. The reed serves as a comb to pass between the warp yarns and push the weft yarns up to the fabric under construction. This is called the beat-up motion referring to the action of the reed as it pushes the weft yarn into the body of the fabric being woven. The let-off motion provided more yarns needed for the weaving operation while the take-up motion removed the fabric as it is woven on the loom.

The design of the traditional woven strip is plain weave that is the order of interlacing of the warp and weft yarn, one warp yarn up and one weft yarn down. This is for the main strip. The finishing of the traditional fabric requires the joining of the strips to make the width of the required cloth. The joining of the strips has to be modified by weaver so that the woven cloth on the modified loom should look like the already joined strips. To achieve this weaving technique the weaver introduced basket weaving techniques to demarcate the stripes and maintain the aesthetic and design qualities of the traditional woven fabric. Seven prototype samples were

woven before getting the required samples that number eight, Prototype 008 and nine, Prototype 009, of the woven samples resemble the traditional *Tukurdi* strips (Plate 5).

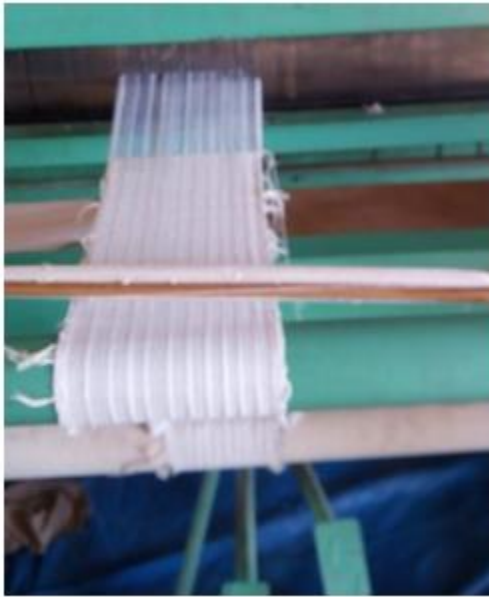


Plate 5a: Prototype 008 (Waziri, 2018)

5b: Prototype 009 (Waziri, 2018)

Prototype 008 was warped and woven as the works of eleven traditional weavers put together and Prototype 009 was woven as the works of eighteen traditional weavers put together. When the weaving processes were finished the samples Plates 6b and Plate 6c, they were taken to the traditional indigo pit dyer together with the original traditional fabric produced by the traditional weavers Plate 6a, was bought in Kura market, Kano State, for the first process of the special traditional dyeing technique. The fabric in Plate 6a is an original traditional *Tukurdi* fabric bought for comparison with the prototypes.



Plate 6a: Traditional *Tukurdi*, 6b: Prototype 008

6c: Prototype 009

Indigo Pit Dyeing

Indigo Pit dyeing operation was done only with hand spun yarns, because the dyers believe that machine spun yarns can't absorb their pit dyeing method. The researchers had to argue with the pit dyer that the prototypes will not take the deep indigo blue pit dye, this was because the dyer was told by the researchers that they used the machine spun yarns for the warps and the strip demarcation, and the hand spun yarn for the weft, before he finally accepts the experimental dyeing. The two types of fabrics tied and dyed at the same time for proper comparison. The fabrics dyeing took two day for the tradition dyeing method.



Plate 7a: Dying the Samples



7b: Checking the Samples (Waziri, 2018)

They could not get any apprentice as none of their sons or grandsons wanted to join them because of their daily earnings. The fabrics were tied and dyed to show both the original fabrics and their indigo dye acceptance. The three fabrics have the same shade of the indigo dye absorptions. This is a breakthrough in getting fabrics that resemble the traditional *Tukurdi* veil. The dyed parts are half the length of the traditional fabric and the prototypes to enable the calenderer can do final finishing.

Here the result of the dyeing was the required deep indigo blue, traditional dyeing method as the first process of finishing of the *Tukurdi* veil. This was possible because the weaving process was

done with the weft of traditional hand spun cotton yarns and the prototype fabrics absorbed the indigo blue dye and made the same shade with the traditional fabric. The dyed fabrics were collected and taken to traditional calenderers in the same Kura town which is the home *Tukurdi* veil or otherwise known as *Yar Kura*. This the name given to the *Tukurdi* veil produced in Kura town.



Plate 8a: Traditional



8b: Prototype 008



8c: Prototype 009 (Waziri, 2018)

Traditional Calendering

The next stage was the special traditional calendering as the final finishing. The researcher did not find any difficulty in the calenderer accepting the samples for calendering as the deep blue indigo dyeing of the traditional fabric and the prototypes are of the same shade of the dark indigo blue.



Plate 9a: First beating



9b: Dye and fat application



9c: Final beating (Waziri, 2018)

The fabrics were folded into two and then damped with water. The first stage of the calendering was just the damped indigo dyed fabrics and calender them until they were completely flat. The next stage was the addition of the indigo modern dyestuff pigments and animal fats to the fabrics under calendering. The third stage was application of the dye stuff and animal fats to the fabrics and the wooden mallet until uniform appearance was achieved. After these treatments the animal fat is still added to the mallet while beating.

RESULTS

Out of the nine different samples woven the researcher was able to get the number eight plate 11 and the nine plate 12 as the prototypes the almost resembled the original traditional narrow band

fabrics. Plate 11 was prepared with the works of eleven traditional weaver put together and Plate 12 was the works of eighteen traditional weavers put together.

On calendering of the traditional and the prototypes are as shown in plates 11a, plate 11b and plate 11c the traditional fabric was smoother than the prototypes which show lines of joining of the strips even on the shiny surface of the fabric. Although the prototypes are shining the thickness of the yarn used in showing the strips were more than yarns used for the strips that was why prototypes were not smooth. The difference between the traditionally manufactured fabric and the ones produced on the modified loom can be seen clearly on plate 11.



Plate 10a: Prototype 009



10b: Prototype 007 (Waziri, 2018)

Although the prototypes were shining like the traditional fabrics a lot of work need to done in order to get the breakthrough of producing a fabric that could be acceptable by the users and marketers of the traditional *Tukurdi* veil for a proper rescue of the traditional disappearing fabrics. The traditional and prototypes were all doubled folded for the shining calendering effect. The researcher was told that the shining effect is only made on one side of the *Tukurdi* veil it is the users who know how to wear the turban bring out the shining side on top of their heads. The showing of the other side of the veil with no *shiny* effect is the originality of the fabric.



Plate 11a: Traditional
(Waziri, 2018)



11b: Prototype 008



11c: Prototype 009

DISCUSSION

After the final finishing of the two fabrics, the prototypes were shining like the traditional fabrics but the line of demarcations of the prototype strip samples were showing clearly while the traditional fabric has no demarcations. The Chinese tried to produce the plain *shiny* fabric but it was not acceptable because the *Tukurdi* veil carries both *shiny* surface and strips surface to show the originality of the veil. All the researchers need to do in order to get the breakthrough of producing a fabric that will resemble exactly like the traditional *Tukurdi* veil is to explore another production method that could eliminate the stripes on the shiny surface of the prototypes production method. There is need to produce a fabric with the modified loom which will conceal the line of demarcations on the shiny part of the woven strips for a proper rescue of the traditional disappearing fabrics that can encourage narrow strip cloth weaving by the youths.

Traditional fabrics woven with different yarns and techniques are not regarded as prestigious as those woven with the hand spun yarns, traditional weaving techniques and with the traditional *Tukurdi* looms. The Chinese tried to imitate the *Tukurdi* product as they the Kente cloth of Ghana but the *Tukurdi* market had refused the substitute as it cannot display the strip design on the fabric

With the investigations done, the results found are that the narrow strip production is going into extinction as most of those handling the trade are old men and they have very few or no apprentices to continue with their inherited skills. The study was able to produce the narrow strips types of cloths as prototypes of the traditional fabrics with the modified steel loom, although not appearing as the prestigious traditional fabrics but could act as substitute to the disappearing narrow strip cloth production. Substitutes have preserved so many crafts and their productions had helped to replace the traditional products and even be within the reach the less privileged in the society.

Lamb and Holmes (1980) stated that, “the main use of this loom is to produce the cloth for *Tukurdi* veils so beloved by the Tuareg, the Teda, various Arab groups in the Sahara and the Moors of Mauritania.” They added that, “There appears to be no rural Nigerian demand for *Tukurdi*. It has, however, found its way into certain Fulani Court uses and, as such, is marketed in Kano.” This is because of the time spent in the production of the narrow strip *Tukurdi* veil made it expensive and the fact that it is considered a treasured item, the cost of this fabric is not within the reach of the well to do Nigerians not to talk of the poor.

All the researchers need to do in order to get the breakthrough of producing a fabric that will resemble exactly like the traditional *Tukurdi* veil is to explore another production method that could eliminate the stripes on the *shiny* surface of the prototypes production method. There is need to produce a fabric with the modified loom which will conceal the line of demarcations on the *shiny* part of the woven strips after the final calendaring for a proper rescue of the traditional disappearing fabrics. Extra effort need to done on production process of the modified steel loom in order the get the exact appearance of the traditional veil after the finishing process. Inter disciplinary research of the Industrial Textiles Designers, Mechanical and Electrical Engineers must came together for a proper motorization of the modified steel frame loom fabric production.

Another aspect of this study that will help socio-culturally is the training of youth and the revival of the production of the disappearing traditional narrow strip fabric weaving. The technological

and industrial significance of this study is that the modified loom could be the basis of establishing an industrial and technological research institute for the development of textile machinery. The economic significance of this study is the transformation of the traditional men's narrow horizontal loom from traditional to a modified mechanised loom which could be organized into industrially based small scale textiles centres.

CONCLUSION

The following conclusions are drawn from this research: Imitation is as old as human history, and from father to son and mother to daughter, this has been the trend. The fact that the traditional woven strips are valued so much by their users, does not mean that the prototypes could not serve the same purpose. When the manufacture of the prototypes were perfected on the modified steel loom it could compete with the traditional cloth, substitute and even bring down the prices of the traditional fabric.

The marketers are buying second hand narrow horizontal cloth at higher prices than the new ones, an indication that the old fabrics are of better quality and that the able hands are no more practicing the craft or they have gone to extinction.

The traditional horizontal loom fabrics though having value and prestige are going out of extinction because the marketers are already relying on the second hand cloth, referring to them as the best product in the market now.

The following are the recommendations made based on the work carried in this study; 1) Government should invest in a strong Research and Development (R&D) for high levels of scientific and technical man-power for promoting indigenous technological development, which will serve a useful economic purpose for the nation. 2) The Nigerian textile technologists should design a curriculum for textile machine design and production which will be strengthened by supporting a postgraduate programme covering textile electronics and loom computer control systems. 3) Further work should be done on the modified steel frame loom to improve the quality and aesthetic appeal of its products.

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