

Innovations in African Textile Fabric Productions: Implications and the way forward

Comfort Chinyere UMOH

Department of Home Economics Education
Faculty of Vocational Education Library and Information Science

Prof. Uduakobong Aniebiat OKON

Department of Agriculture Education,
Faculty of Vocational Education, Library and Information Science,
&

Dr. Bukola Opeyemi OLUMUYIWA

Department of Home Economics Education
Faculty of Vocational Education Library and Information Science
University of Uyo

comfortumoh06@gmail.com,
uduakobong.aniebiat.okon@gmail.com,

Abstract

African fabrics play vital roles, apart from serving for beautification and protection, African fabrics also send coded messages and signals. However, the obsolete technology used in producing many African fabrics has impeded competitiveness and proper recognition in the global market, it is therefore necessary to incorporate technological standards with conventional wearing and designing processes to the end that African fabrics still expresses the African cultural heritage at the same time being aligned to world standards and requirements. Technology can be applied in the use of computers for designing, automated looms, production of smart fabrics which can be used as life jackets, vests and as sport wears. There is however the need to increase the competitiveness and global recognition of African fabrics by fully embracing technological standards in fabric production and colourations. It was suggested among others that Africans must seriously consider the complete transition from the use of manual vertical and horizontal looms to high automated looms. Natives can be trained on how to operate high speed automated looms so that high production is obtained as well as a full symbolized culture.

Keywords: Innovations, Fabrics, Production, Technology, Textile

Introduction

Textiles fabrics have been known for playing a very vital role in the life of mankind. Apart from serving for protection and beautification, textiles also helps in

identifying and distinguishing ethnic societies from one another. According to Acquaye, *et al.* (2018), throughout history, textiles have been used to cover the body and to protect the body from cold and heat; can also be used to send social cues to others, to insulate and decorate living spaces and surfaces, it also express personality, gender, family affiliation, social status, occupation, religion and ethnicity. Thus, the culture and belief system of a given people can be expressed through their clothing (Adom, *et al.*, 2016).

Most, if not all African fabrics are symbolic and carry meanings known by the traditional weavers and dyers that produce the fabrics, as well as natives who wear and sell them. For example, colours are symbolic, wearing certain colours communicate unspoken messages (Kodzo, 2017). Therefore, African fabrics can be used to pass messages across to others. Most African fabrics are locally woven and dyed by traditional weavers and dyers. Traditional looms and natural dyes from natural sources such as leaves, tree barks and even mud are mostly used in dyeing of fabrics; this is probably because these traditional messages can only be satisfactorily engrafted through traditional production (Akrofi, *et al.*, 2016).

Over the years, African textile production has encountered very minimal development, this is because of their inability to adopt the use of new and automated textile machineries, while developed countries like China and USA are presently trending in nanotechnology and smart textiles technology (Berglin, 2013). Unfortunately, African textile firms are yet to follow this trend (Idowu, *et al.*, 2013).

Despite the development of textile production around the world, there has been a slow progress in the development of African fabrics. This slow progression accounts for its lack of recognition in the global market. Although African fabrics are yet to encounter rapid technological development, a few innovations have been recorded in the production of unique African textile fabrics, this has gained the African fabric a niche in global textile production.

A few African fabrics have been brought to the fore in the world textile market. Among these fabrics are the *Kente* fabric from Ghana, Mudcloth from Mali, African wax fabric, *Adinkra* from Ghana, *Kuba* from the Democratic Republic of Congo, *Akwete* from South- East Nigeria, *Aso-oke* and *Adire* fabrics from Southern Nigeria.

Types of African Fabrics

Kente Cloth: *Kente* is considered the most famous of all African textiles and is woven using one of the world's most complicated weaving process. A genuine *Kente* cloth is produced by the Ewe and Ashanti people of Ghana in Africa (Katz, 2017). Kodzo (2017) opined that *Kente* is a fabric local to Ghana and nearly most West African countries. It is believed that *Kente* cloth was inspired by the weaving pattern of a spider.

The *Kente* fabric is woven by a loom known as the narrow horizontal loom. The fabric is hand-woven in four inches wide stripes. It can take almost a whole day

to weave just a strip. *Kente* cloth is completely a hand craft with no machine is involved. As such, an original *Kente* cloth is labour intensive and requires a lot of skill in making it. Also, the colours of *Kente* cloth are symbolic. Green signifies growth, harvest and vegetation, yellow denotes prosperity, royalty and richness (Kodzo, 2017).

Innovations in *Kente* Weaving: The broadloom is a loom that has been inculcated in the effective weaving of *Kente*. The broad loom machine has been adopted in weaving a wider dimension of *Kente* fabric and also to create more complex and intricate designs (Adom *et al.*, 2016).

Bogolan fini or mud cloth: According to Akrofi, *et al.* (2016), “Bogolan” is a Bamana word which means something made using mud, while “fini” means cloth. Furthermore, the Bamana lived to the East and North of Bamako in Mali and they are the original producers of mud cloth. Just like the name implies, mud cloth is made by dyeing fabric with fermented mud. Traditionally, the mud decoration is done using the application of natural two natural dyes. The first dye is made from leaves gotten from a tree known as African birch (*Anogeissus leiocarpa*). The meshed leaves are either soaked in water for 24 hours or are boiled for a few minutes. The dye is used in dyeing the fabric and the dyeing process is repeated until a deep yellow coloured fabric is obtained. Patterns are drawn on the dyed fabric in preparation for the application of the second dye.

The second dye is mud which is collected from the river bed and left to ferment in mud-jar for a year. The mud is used to paint on the design drawn on the fabrics. A chemical reaction occurs between the leaf dye and mud dye that bonds the mud to the fabric even after washing and bleaching of the fabric (Akrofi, *et al.*, 2016; Mukta *et al.*, 2012.). The leaf dye used in mud cloth acts as a mordant to fix the mud unto the fabric. (Akrofi, *et al* 2016).

Innovation in mud cloth: Newer motifs are often found on mud clothes, these designs have found a wide range of application in commercial products. (Akrofi *et al.*, 2016).

Adinkra Fabrics: Adinkra fabrics are produced from hand-woven cotton fabrics and roots from the roots of *kuntunkuni* plants. The fabric is printed with *Adinkra* symbols that have symbolic interpretation (Richard, 2018). *Adinkra* originates from Ghana. The designs used for *Adinkra* fabrics are from materials and immaterial sources.

Adinkra fabric has been noted for two colours (white and black colours). It is used for occasions such as naming ceremonies and funeral events. (Josephine and Kemevor, 2018). *Adinkra* symbols have various meanings. They are visual representations of proverbs which have significant and philosophical meanings; for

example, a hen's leg symbolizes mercy and nurturing (Poirier and Eglash, 2014). It was originally worn by royalty, and found at ceremonies, however, it is now used in furniture, sculpture, clay pots and casual wears (African Activities). Examples of some symbols of *Adinkra* fabrics: The heart symbol signifies a symbol of patience and tolerance, palm tree is a symbol of wealth, resourcefulness and self-sufficiency, ram's horns symbolize strength and humility etc. (African Activities).

Innovations in *Adinkra* Fabric: As a result of the short comings in the old approach of the *Adinkra* cloth, production using stamping and hand printing of the cloth, screen printing has been adopted by recent producers, also embroidery stitches are included in the designing. Ghana's *Kente* fabric can be inserted as a substitute for embroidery. This reduces the time for producing the clothes and also reduces the cost of production.

The *Adinkra* cloth has gone through series of development which has been in line with changes in the preferences of consumers who demand for more colourful varieties of the cloth. Though these changes are slow, there is a gradually development in the production especially in the Ghanaian fashion market. (Josephine, *et al.*, 2018).

Another innovation is in the use of digital printing in producing designs. Here, the photoshop or Adobe illustrator, software is used in digitally printing designs (Josephine, *et al.*, 2018).

Ankara fabric (African print) : Akinwumi (2008, p.179) opined that African print is a general term employed by the European textile firms in Africa to identify machine-printed fabrics which are printed with wax resins. African print has evolved in usage to include wax print fabrics of African-based printing firms, European-owned printing firms and African-based European-owned printing firms. (Osuanya, 2018). According to Richard (2018), the African prints are not really African in origin but has been accepted and adopted by African and has undergone changes. The acceptance was due to its affordability and climate-suitable texture (Oyedele, *et al.*, 2013).

African print was initially known as Dutch wax and it started as a mass-produced Indonesian-batik fabric which was 'deformed' during production and was rejected by the intending Indonesia market. The fabrics were produced by Dutch textile manufacturers and were introduced to Holland and other parts of Europe. The fabrics were accepted by the African market. The Dutch manufacturer's made some changes to the designs and motifs used in design. Later, indigenous designs were imbibed in 1920, portraits of local community leaders and chiefs were used in designing (Oyedele, 2012).

Nowadays, symbols and motifs used include leaves, flowers, animals, money, cars to mention but a few. Designs and colours used in African prints depict the weavers' tribal origin (Oyedele, 2013). There are various grades of Ankara fabric,

there is real Dutch wax, veritable Dutch wax and Hollandise plate 1 & 3. The Real Dutch wax is the highest grade.

Innovation of ankara fabric production: Nowadays, Ankara printing can be done through computer aided designs. Recently, a computer design was generated in which the designs are drafted out using mathematical expressions to see if they will fit well in the design pattern. If it did not fit, the printing pattern is properly arranged and the final printing is done on the textile fabric. MATLAB is the computer programme that was used to generate and implement the patterns. MATLAB also made passion for coding and decoding of colours. The colours are y for yellow, m for magenta, c for cyan, r for red, g for green, b for blue, w for white and k for black. (Elegbede, *et al.*, 2019).

Kuba cloth: Kuba cloth is produced by the Kuba people who reside in the Central Kasai area of Democratic Republic of Congo. The Kuba people have the practice of weaving and decoration of textile as a primary part of their life. Men, women and even children engage in this craft (Sabri, 2012; Wilson, 2018).

The Kuba clothes are produced from a raffia fibre known as the *Raphia Vinifera* palm. (Sabri, 2012). The basic woven cloth unit measures approximately 26 x 28” which is defined by the length of raffia fibres. (Sabri, 2012).

The Kuba people use the raffia palm because of the level of importance that they attach to the raffia palm; which grow abundantly in the area. The raffia cloth is produced on a single-heddle loom. (Wilson, 2018).

Innovations on kuba cloth: Not much innovations are recorded in Kuba cloth production, however, a few innovations are recorded in the use of digital machines to produce print patterns. According to Sabri (2012), digital tools can be used to transform ornamental patterns into wrinkled facades. The application of colour and thickness to their ornaments can produce interesting effects.

Bark cloth: Bark cloth is produced by the Ugandan people of Africa. Uganda bark cloth has been recognized by UNESCO as the master piece of the “Intangible cultural heritage of humanity”. (Prabhuraj, *et al.*, 2019). Basic cloth is made from the wild fig or *Mutaba* tree (*Ficus natalensis*). It is a highly skilled craft done by men (Prabhuraj, *et al.*, 2019).

The bark of the *Mutaba* tree is harvested by splitting the bark, steaming and soaking it to soften it. It is then pounded with specially designed mallets. It is sunned to produce the rich dense colour that bark cloths are known for.

Innovation of Bark fabric: A lot of researches have been carried out on Bark tree. One of such is the production of fibre composite materials from bark cloth. Here, the

bark cloth reinforced lamina epoxy composite was carried out for the first time using vacuum assisted resin transfers moulding. (Samson, *et al.*,2015).

Nigerian Fabrics: The Nigerian society has different cultural heritages which are hinged on specific tradition norms (Ajila, 2016). These various cultures differ in their ways of life. These varieties are reflected in their food, languages, fabrics as well as fashion. Despite the differences in fabric production and dyeing or printing, a few similarities can be seen across most cultural background for example, *Adire* and *Aso-oke* by the South West, Hausas are known by a fabric called *Kura*. The Igbos are known for *Akwete*. The Tiv tribes are known for “Andee” etc. (Ajilia, 2016).

These fabrics are produced with almost the same type of looms and techniques. For example, the main equipment used for weaving is the vertical and horizontal looms. (Ajila, 2016). Ojo (2006) described the vertical loom as an upright single heddle loom (broadloom) and it is used by women while the horizontal loom, used by man are described to have double heddles and more assertiveness.

The traditional vertical loom produces about 38cm to 51cm width of fabric and is less sophisticated than the horizontal which is known to produce about 12.7cm width of fabric. The fabric drape and tensile strengths is dependent upon the tightness of the weave (Ajilia, 2016). Nigerian fabrics usually are usually a symbolic and relay unspoken messages that are related to the culture in question. The slow manual (traditional) production process enable the weavers to painstakingly engraft the symbolic messages into the fabric being woven. Mostly, natural fabrics as well as dyes are used. These dyes can be gotten from leaves, flower, tree barks etc.

Adire Fabrics: *Adire* is another locally made textile produced by the Yoruba people in South West of Nigeria. *Adire* means tie and dye and employs various techniques in producing a variety of fabrics (Braide, 2016). *Adire* fabric is produced by dyeing a dark background with light patterns using resist agents.

According to the Mukta (2012), the main centres of *Adire* are Abeokuta and Ibadan, however smaller dyeing centres can be found throughout most South Western States in Nigeria. Mukta, *et al.* (2012) opined that there are two broad categories of *Adire*; which include *Adire Oniko* and *Adire Eleko*. In *Adire Oniko*, the resist agent is raffia which is also called *Iko*. in which the resist is made by tying the raffia onto the fabric. In *Adire Eleko*, the resist agent is starch, also known as *eko*, which can either by painted or stenciled unto the fabric by the dyeing operation. The design and the decorative elements on the *Adire* cloth are a meaningful part of day-to-day life. *Adire* cloth just like many other African-produced fabric have a visual language. The meanings derived from the patterns on *Adire* fabrics today seems to be lost. (Braide, 2016). Traditionally, colour is applied using vegetable dye (*Elu*) indigo, the dyes are fixed into the fabric by the use bio-mordants such as wood ash.

Innovation in *Adire* fabrics: The contemporary version of *Adire* is generally referred to as *Kampala* which is produced in other parts of Nigeria. This indicates that the cloth is not tied to any cultural background. (Braide, 2016). *Adire* was usually produced with natural dyes but nowadays, synthetic dyes other than blue are used to produce multicolour effect (Mukta, 2016).

There is an increasing frequency in the use of stencil printing by contemporary dyers. Here, cardboard, sticker, papers are used to produce intriguing designs. (Braide, 2016). Today, contemporary *Adire* appears in a wide variety of social context, few of which are related to the traditional use of *Adire* (Braide, 2016). The contemporary techniques in *Adire* production can also be reflected in variations of folding patterns (*Adire kika*, knotting patterns (*adire siso*) and starch resist (*adire eleko*); machine stitch (*adire alabere*).

Gradually, these contemporary techniques of *Adire* production are been taken over by machine stitch, marbling (*Adire elesun*) and discharge (*Adire bibo*) which is commonly referred to as *kokobilo*). According to Braide (2016), these innovations are aimed at greatly reducing production time and improving the quality and quantity of production.

Akwete Fabric: *Akwete* cloth is made from Ukwa East Local Government Area of Abia State, Nigeria (Ikegwu and Uzuegbu, 2015). According to Ikegwu and Uzuegbu (2015), *Akwete* was projected into the global community by scholars through their contact with colonial masters. It is believed that the *Akwete* had been in existence before the coming of the Portuguese traders who were around in the 15th century (Igbokwe, 2023).

The local loom used to produce *Akwete* is called *Nkwe* by the Igbo people. The *Nkwe* is made of bamboo. Just like other Nigerian looms, there are horizontal and vertical looms, women use the vertical loom and the men use the vertical looms. According to Chukueggu (200), other materials used for production include *Egbu-Nkwe* (used in binding the warp threads together), *Otire* (used for shedding and beating-up the inserted weft threads). The *Agba* (the shuttle), *Ekike* (a comb-like wooden material used to regulate the width of the fabric and keep the shed open; *paapaa* (a flat shed stick used to separate the alternate warp threads). *Ahia* (the heddle), *Nkpo* used to introduce design unto the fabric during weaving. Initially, weavers used raffia, silk and cotton fabrics coupled with vegetable dyes (Chukeggu, 2000).

Innovations in *Akwete* Fabrics: Over the years, a lot of innovative developments have been adopted in the production of *Akwete* clothes. Firstly, the bamboo looms are now replaced with wood and iron-made looms (Chukueggu and Jovita, 2013). Also, present *Akwete* fabric designing is dependent on taste and trend in the society,

market demand and the skills of the weavers. (Nowadays, weavers produce rich contrast colours and textures.

As opposed to the raffia, silk and cotton fabrics with vegetable dye used in the past, modern weaving is now done with blends or mixtures of cotton, nylon and metabolized yarns. Also, bright, warm and glittering colours are used in dyeing in addition, the designs can be done on both sides of fabric. Embroidery is also included when desired (Chukueggu and Chinedu, 2013)

Aso-Oke Fabric: *Aso-oke* fabric is a fabric which originates from southwestern Nigeria and is woven by the Yoruba people of Nigeria. *Aso-oke* technology is known to predate the arrival of European contact but was positively impacted by colonial policy (Ajayi, 2000). *Aso-oke* is also called *Aso-ofi* because of the process through which it is produced. *Aso* in Yoruba means cloth while *ofi* means loom. (Olutayo, *et al.*, 2017). *Aso-oke* can be woven with horizontal and vertical loom like other local fabrics. (Adu, 2019).

Innovations in Aso-Oke Production: The modernization of *Aso-oke* production has encompassed the intervention of finely produced treading loom production techniques have also been improved upon by substituting the wooden treading loom with metallic looms having additional technology (Adu, 2019). Also, Adu (2019) opined that yarns were now imported from China. Also, the use of technology has been adopted in producing intriguing designs, complex designs are being attained with the use of computer and such design can be arranged in the computer before the design is imprinted upon the fabric.

Dyeing is now processed with industrial manipulations, various colours aside the black and blue that was commonly used are being used now. Presently, there are various colours and shades which are provided to meet individual and group interest (Adu, 2019).

The Way Forward in the Production of African Fabrics

African is blessed with rich and abundant natural resources as well as cultural heritages, these has served as useful raw materials for the African textile cottage industries (Ogunwusi, 2013). Over the years, the cultural heritages of most African countries have been successfully conveyed through fabric. Fabrics constitute one of the various ways through which the culture of African is expressed (Dereje, *et al.*, 2013). African fabrics send signals and messages that are being understood by natures of the community (Impraim, *et al.*, 2018).

For some African fabrics, modernization might mean losing cultural messages carried by the fabrics. This is evident in African fabrics such as ‘Adire’ According to Braide (2016), the visual language and meanings that were initially derived from Adire cloth seems lost today. Another African fabric that is faced with

this risk is the Ankara fabric, the traditional meanings and symbols of Ankara also seems to be lost to modernization of the fabric.

On the other hand, so many African fabrics that still have managed to retain their cultural meanings have barely experienced developmental innovations. On the way forward, there must be a deliberate compromise whereby technological production is combined with cultural symbols and meanings of the fabric.

Acquaye (2018) proposed a series of collaboration whereby technology, new material colour resources and global trends are used to produce forms/motifs/visual language and then used for commercial designs based on indigenous West African theme. This was achieved by adopting traditional artistic and graphic aesthetic such as symbols, design motifs, totems and insignia. The graphic aesthetics are creatively manipulated via digital technology then using a mechanized printing process for completion.

Akinbileje (2014) also asserted that contemporary African art is dynamic. This is possible because African art now incorporates western ideas and materials adapted with traditional belief system and concerns.

Technology is relevant because it improves productivity and innovations. According to Aminu (2016), major challenges that undermine competitiveness of Nigerian textiles in the African regional market among others is the prevalent use of obsolete technology. Therefore, there is the need to improve technology and upgrade it to global standards. Aminu (2016) implies the technology also enhance competitiveness of the fabric in the African regional market and the global markets.

The vertical and horizontal looms used in weaving most African fabric even till date in some areas are made of bamboo wood or at best, metal. The looms are manually operated which impedes productivity and speed. The use of manual loom reduces productivity and increases time of production. Also, manual production can increase the fabric faults thereby decreasing the quality of the fabric. Globally, to achieve very high productivity, fabrics are woven with automated looms, gradually there has been a development from shuttle looms to non-shuttle looms in which air, water projectile, rapier, looms etc. is used to insert weft yarns during weaving. Through manual production being sustained by African countries help to maintain symbol cultural heritage which is believed to be best engrafted into the fabric by local weavers, local producers can liaise with the international textile manufacturers to see how machines, can be designed but also can still transfer the desired symbols into the fabric.

African fabric dyers majorly utilize natural dyes and mordants from natural sources such as tree barks, leaves, flowers and even mud as in the mud cloth.

The use of technology can also be translated in the use of computers for designing (Josephine & Kemevor, 2018). Another important aspect of the use of technology is in the production of smart fabrics. Smart fabric is in collaboration between the field textile designs and electronics. It is a technique that incorporates

conductive yarns directly into a textile structure through weaving. (Yinka and Salau , 2017). Smart fabrics are useful in the medical field, it can be used in making life jacket; producing babies vest and socks to monitor vital organs. It is also used for sport in monitoring heart rate, breathing rate etc. (Yinka and Salu, 2017).

Summary

African fabrics reveal cultural beliefs of Africans. African fabric include: Bark cloth, *Kente* cloth, *Asoke*, *Bogolanfini* Ankara fabrics, *Kuba* cloth etc. apart from serving for beautifying and covering purposes, African fabrics have been known for transmitting age long messages from one generation to another. Unfortunately, the introduction of technological innovations is gradually eroding away this cultural heritage. This can be seen in Ankara fabrics which is quite exposed to technological innovations and development.

On the other hand, African fabrics that have managed to maintain their cultural beliefs are still stocked in their ancient obsolete technology and the natives prefer to produce the fabrics themselves using manual vertical and horizontal looms and dyeing procedures.

Generally, very little developments have been recorded in the production of African textile fabrics that has impeded its competitiveness and recognition in the global textile market. On the way forward, there is need therefore to incorporate technological developments while strictly ensuring that age long cultural messages are not tampered with.

Technology can be introduced in the use of high speed automated looms and dyeing machines, thus ensuring high production and quality of fabric. Also, the desired width of fabric can be produced thereby preventing unnecessary joining of short strips of fabrics to obtain a required length. Technology can be further employed in the production of smart fabrics using African fabric following the climatic and environment changes of African continent.

Conclusion

African fabrics are known for aesthetics and elegance and are also noted for transmission of symbolic messages from one generation to the next. African natives prefer to weave their fabrics in order to retain these heritages in the fabrics. There is however the need to increase the competitiveness and global recognition of African fabrics by fully embracing technological standards in fabric production and colourations.

Suggestions

1. Africans must seriously consider the complete transition from the use of manual vertical and horizontal looms to high automated looms.
2. Natives can be trained on how to operate high speed automated looms so that high production is obtained as well as a full symbolized culture.

3. African fabrics producers should take advantage of the smart fabrics technology and nanotechnology to combat climatic changes in our environment.
4. There should be a diversification in the type of fibres. The use of synthetic fabrics cannot be overlooked, to produce a vast variety to select from.
5. The use of natural dyes should be maintained and improved to maintain a safe African community.

References

- Acquaye, R., Sawyerr, N. O. & Kusi, C. A. (2018). From traditional to innovation: Indigenous West African textiles creative interior application. *American Journal of Art and Design*. 3(2): 18-25. Doi:10.116481j.ajad.20180302.11
- Acquaye, R. (2018). Exploring indigenous West African fabric design in the context of contemporary global commercial production. University of Southampton, Doctorate Thesis, 181pp.
- Adinkra symbols with meanings. African activities.www.africanactivities.org.uk.info@africanactivities.org.uk
- Adom, D., Baah, S. K., & Bonsu, H. S. (2016). The influence of European elements in Asante Kente. *International Journal of Innovative Research and Advanced Studies (IJIRAS)* 3(8).
- Adu, F. M. (2019). Indigenous knowledge in the era of globalization: dynamics in Aso-oke production in Yoruba land, Nigeria. *Global scientific Journals*. 7(3): 710 – 729
- Ajila, K. D. (2016). An appraisal of traditional woven fabric production in Southwestern Nigeria. *European Journal of Sustainable Development*. 5(1):63 – 76.
- Akinbileje, T. Y. (2014). Symbolic values of clothing and textiles art in traditional and contemporary Africa. *International Journal of Development and Sustainability*. 3(4): 626 – 641
- Akrofi, M., Ocran, S. P. & Acquaye, R. (2016). Decoding the symbolism of Bogolanfini, Korhogo and Fon fabrics. *African Journal of Applied Research* 2(2): 59 – 72.

- Akunwumi, T. (2008). The “African Print” Hoax: machine produced textiles jeopardize African authenticity. *The Journal of Par-African Studies*.
- Aminu, S. A. (2016). Why Nigerian textiles are not competitive in the African market. *Ilorin Journal of Marketing*. 3(2): 133-143.
- Braide, O. O. (2016). Stylistic features of contemporary Adire in Nigeria Textile Practice. *Journal of Humanities, Social Science and Creative Arts*. 11(1): 104 – 116.
- Chinedu, C. C. & Jovita, O. C. (2013). Akwete weaving in secondary school curriculum in Imo State: A Proposal. *The Crab: Journal of Theatre and Media Arts*. (8) 1- 11.
- Dereje, D., Liu, J. Y. & Zhou, J. (2013). African textile design and fabric arts as a source for contemporary fashion trends. 2nd International Conference on Science and Social Research (JCSSR 2013) Doi: 10.2991/icssr-13. 2013.50
- Elegbede, A. W., Olusanya, O. O., Oyediran, M. O. & Amole, A. O. (2019). Development of a matlab based pattern design system for plain textile (Ankara) *IOJR Journal of Computer Engineering (IOSR - JCE)* 21(6); 35 – 41. Doi: 10 – 9790
- Erin, M. R. (2020). The pattern of maternity: Textiles in Art, Fashion and cultural memory in Nigeria since 1960. A Dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy to the Department of History and Cultural Studies of freie University, Berlin.
- Impraim, S. E., Oduro, B. A. & Owusu, O. C. (2018). Cultural and symbolic interpretation of selected wax print designs on Ghanaian fabrics. *Journal of Humanities and Social Science (IOJPH)* 1(1), 12 – 18.
- Igbokwe, C. C. (2023). Entrepreneurship: impact of Akwete cloth reinvention on capacity building. *Aku: An African Journal of Contemporary Research* 4(4): 79-90.
- Josephine, A. N. & Kemevor, A. K. (2018). Remarking of Adrinka cultural cloth through innovation. *International Journal of Research in Humanities, Arts and Literature (Impact: JRHAL)*. 6(6): 299 – 314.
- Kegwu, J. U. & Uzuegbu, J. O. (2015). Akwete traditional weaving for rural tourism in Nigeria. *International Journal of Environment, Ecology, Family and Urban Studies (IJEFFUS)* 5 (4): 23 – 32.

- Kodzo, L. (2017). Everything you need to know about Kente.
- Mukta, V. L., Zoltan, B., Christiana, S., Aissata, D., Mama, P., Linnea, A., German, S. A. & Lennart, B. (2012). *Textile Research Journal*. 82(18) 1888 – 1896 – 1896. Ogunwusi, A. A. (2013). Bamboo: an alternative raw material for textile production in Nigeria. *Chemistry and Material Research*. 3(11), 6 – 18.
- Ojo, B. (2006). An appraisal of weaving cottage industry in Southwestern Nigeria in potentials of visual Arts and Creativity. CCAF Publication, 2006: pp4.
- Olutayo, A. O., Akanle, O., & Fadina, O. A. (2017). The socio-economic developments of Aso-oke of Southwestern Nigeria. *Asian and African Studies*, 20(1).
- Osuanyi, Q. E. (2018). Deconstructing the concept of “African prints” in the Ghanaian experience. *Africology: The Journal of Pan African Studies*. 11(1).
- Oyedele, A., Motunrayo, T. & Obisesan, B. (2013). The resurgence of Ankara materials in Nigeria. *Journal of Education and Practice*. 4(17).
- Poirier, L. & Eglash, R. (2014). Adinkra symbols.
- Prabhuraj, D. V., Kirsten, S., & Christopher, L. C. (2019). Environmental friendly and sustainable bark cloth for garment applications: Evaluation of fabric properties and apparel development. *Sustainable materials and technologies*.
- Richard, A. (2018). Exploring indigenous West African fabric design in the context of contemporary global commercial production. Thesis for the Degree of Doctor of Philosophy.
- Sabri, G. (2012). The ornaments of shoowa kuba: A digital re-interpretation of a textile art.
- Wilson, R. (2018). Wrapped in Tradition: Ceremonial skirts of Kuba women in the Western Congo Basin. African Studies Student Research Conference 3. <https://scholarworks.bgsu.edu/Africana-studies-conf/2018/001/3>.
- Yinka, B. C. & Salau, A. T. (2017). Smart fabrics – wearable technology. *International Journal of Engineering Technologies and Management Research*. 4(10), 78 - 98 Doi: <https://doi.org/10.2912/ijetmr.v4.i10.2017.109>