

**INTRODUCTION OF INDIGENOUS TANNED LEATHER IN THE
PRODUCTION OF SCHOOL SANDALS**

By

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DECLARATION

I hereby declare that this submission is my own study towards the Master of Philosophy in Integrated Art (Leather Technology) degree and that, it covers no material previously published by any other person, nor material which has been accepted for the award of any degree of any university, with the exception of where due acknowledgement has been made in the text.

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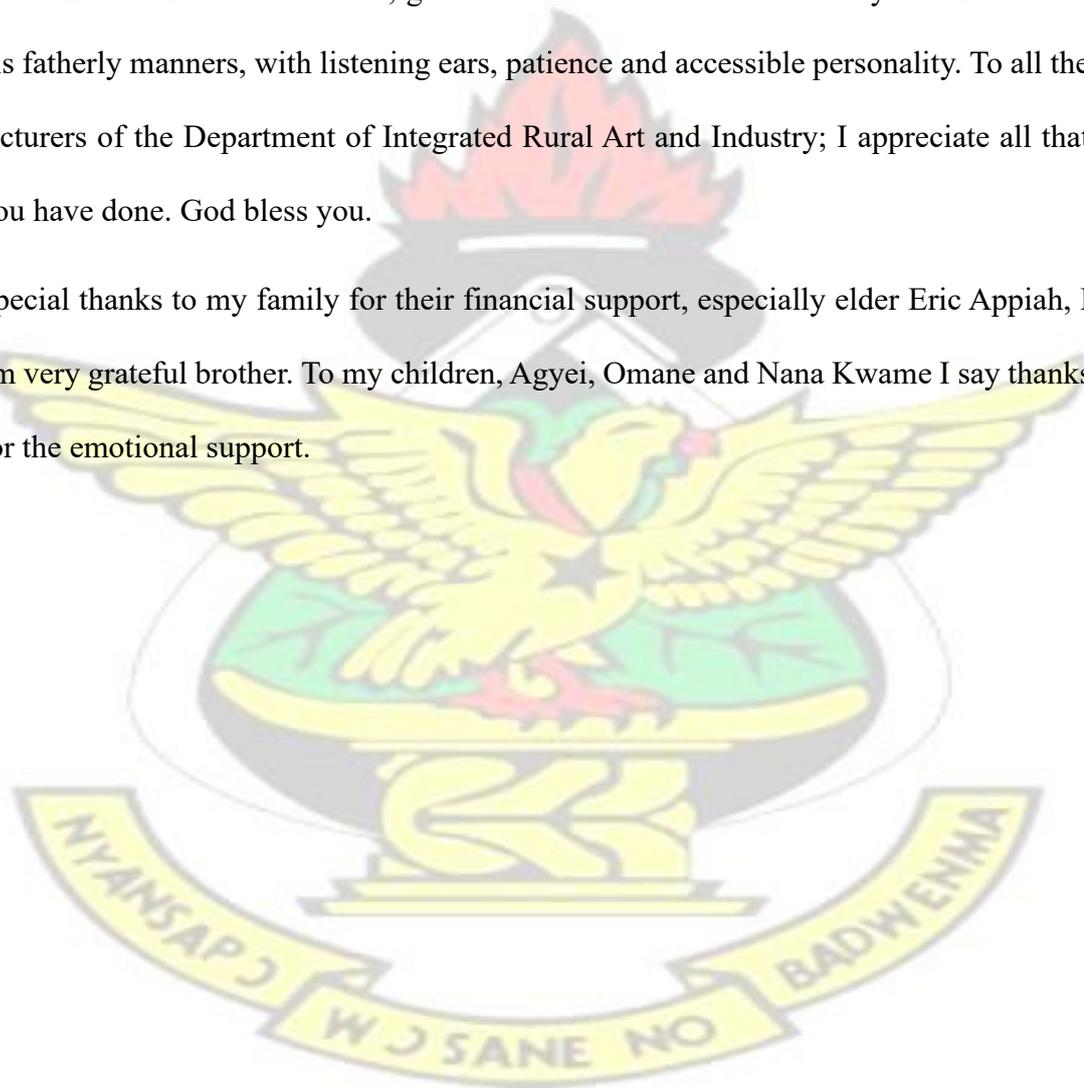
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ABSTRACT

Sandals consist of a sole with a strap across the vamp and a belt passes round the heel to buckle at one side of the foot. Most Senior High Schools in Ghana have introduced the compulsory use of specific type of footwear that demonstrates uniformity in the schools, specifically play deck for girls, as the 'Achimota' sandals was used in the early 1960s. Free school sandals are also produced for students at the basic level by the Government of Ghana that has provided a huge market for footwear producers in Ghana. However, the Footwear industry in Ghana is plagued by high cost of raw materials which are mostly imported. Some producers also resort to the use of inferior materials. This research investigates the potentials of indigenous tanned leather that makes it suitable for the production of school sandals for use by Senior High Schools in Ghana. Unstructured interviews were conducted to ascertain why footwear producers are not using the indigenous tanned leathers in the production of school sandals. Exploratory research was used to modify the situation of the indigenous tanned leathers to make them suitable for the production of school sandals. Experimental research design was adopted by the researcher in the production of school sandals. It was found out that, Pigmented Leathers, Aniline Leathers and Synthetic Leathers are currently used in the production of school sandals. The indigenous tanned leather when taken through the appropriate processes like the secondary treatment and improvement of its flexibility can be used in the production of school sandals. It is therefore recommended that, Tanners improve the quantity of the Chemicals (*Acacia nilotica*) in their tannins to improve the flexibility of the hides for the production of school sandals. Footwear producers on the other hand could patiently go through the Secondary Treatment of Leather before production to increase the tensile strength and emit the bad odour. The government of Ghana can encourage the use of local raw materials for the production of schools sandals. This can be done by making it a requirement for the contractors

producing the school sandals for Basic School children to use the indigenous tanned leather. These will help reduce the importations of the Chrome Tanned Leathers and the use of Synthetic

Leather in the production of school sandals.

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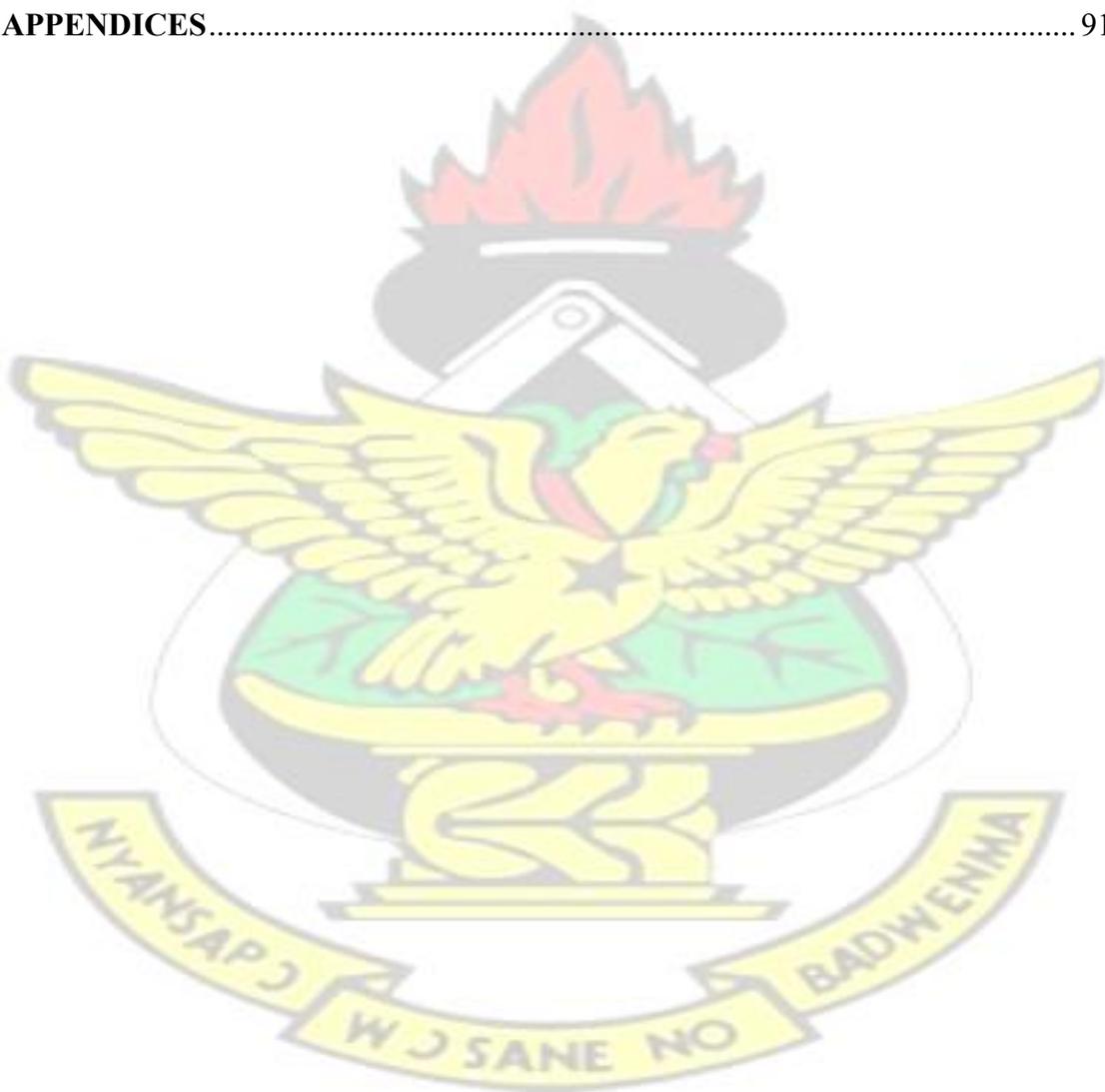
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CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter treated the following sub-topics; background to the study, philosophical foundation, statement of the problem, purpose and Specific objectives of the study, research questions, importance of the Study, delimitation, limitations and definition of Items.

1.2 Background to the Study

Leather materials are used worldwide as shoes, coats, belts, glove, hats, handbags, purses, clothing, etc. Factory workers, soldiers, the police and other security Agencies all wear heavy boots made from leathers; thus confirming the importance of leather in the development of every economy (Akanni and Ibraheem, 2008). African nations' capacity to run a fruitful leather industry is massive as it produces enormous measures of hides and skins (Mokhothu-Ogolla and Wanjau, 2013). The business is one of the key horticultural sub-areas in many nations, and has a high potential for ware advancement to address appropriate issues of financial significance, which effect on provincial improvement, work and riches creation (Mwinyihija, 2010).

In the later past, Kenya has creates about 2.4 million hides, 6 million skins and 20,000 camel hides (Mbogo, 2010). The business depends to a great extent on the huge domesticated animals' asset base from ASALs (Bone-dry and Semi-Dry Grounds) zones which contribute a large portion of the butcher stock, whose conceals and skins are by-items. The business contributes an expected 4% to farming Gross domestic product, and the incomes of nearby market merchants are assessed to be Kshs 1.8 billion every year. The nation additionally acquires around Kshs 4 billion from fares of semi-handled and natural leather. Then again, the ideal development of the business is subject

to esteem expansion. The increment of tanneries from nine to eleven, with two all the more being restored, is a sign that the business is balanced for development, exhibited in the financial review of 2008 that built up a 10.3% development (Mbogo, 2010).

Unfortunately, however, this industry has been facing a lot of crises in the recent times ranging from the declining number of markets and mature livestock animals and the incidence of pest and disease attack on the skin of the livestock animals especially in the relatively hotter regions of the country (Akanni and Ibraheem, 2008). Shehu (1980) also observed that the leather industry was facing serious problems in terms of procuring the necessary tanning materials and equipment. Perhaps the most terrible of the problems confronting the leather industry is the reckless human consumption of the animal skins, especially those of cattle, sheep and goat.

Hide or skin, a substance which is organic with effortlessly degradable capabilities, is changed over into physically and synthetically stable prepared leather by presentation to a progression of compound and mechanical procedures. In a late research work by Covington (2009) these procedures, in which the leather is balanced out and its aqueous security is upgraded, are on the whole called tanning. As indicated by Heinemann (1993) the tannins chose in the tanning procedure give the leather its essential trademark highlights. In this way, while selecting the tannin to be utilized as a part of the tanning process, the execution qualities anticipated from the final item are considered alongside design and the requests of shoppers (Başaran et al., 2006).

While 70-90% of leathers created on the planet are tanned with chromium salts, other mineral tannin salts, for example, aluminum, zirconium, and titanium, alongside manufactured tannins and vegetable tannins are likewise utilized (Aslan 2009, Bayramoglu et al., 2012). Mineral tanning materials tie to the carboxyl gatherings of the leather and charge the leather catatonically. Subsequently, coloring chrome tanned

leather with straightforward corrosive colors shows no trouble in obsession and quickness values.

On the other hand, the leather is charged naturally all together for the tannins to tie to the amino gatherings of the leather (John, 1997). Consequently, obsession and speed issues emerge as it is troublesome for the straightforward dyestuff to tie to the amino gatherings of the calfskin (Muralidharan 1997, and Otto 1978). Water containing unconsumed color waste expands the heap on treatment offices, other than its lethal impacts on the biological community and human wellbeing (Vederaman 2011). Endeavors have been made to defeat these challenges in utilizing vegetable tanned leather by method for different coloring helpers or systems (Sivakumar et al., 2009). As the ecological and human wellbeing awareness of today's shopper expands, the interest for leather items that are prepared by utilizing vegetable tannins and regular polymers is expanding. The expanded predominantly credited to the focal points, for example, that the vegetable tanned cowhides offer.

The circumstance is not diverse in Ghana, as leather items from time immemorial have reduced in taste for their items because of epicureans of indigenous leather (Boahin et al., 2013). There is no known recorded confirmation to show solid endeavors to control the issue locally. Indigenous tanners have made a few purposeless claims for specialized backing to check this unpalatable circumstance which is influencing the business by method for neighborhood and outside exchange.

Explorers and partners of artworks have been whining the foul scent and different difficulties connected with it, the more terrible circumstance happens when the indigenous leather items are left in encased sticky places or rooms. To curb the difficulties numerous significant others of indigenous leather items have needed to keep these things in the outdoors for drawn out stretches of time before utilizing them. On

account of crude calfskin and cowhide items, much is required to make them agreeable to use; in compatibility of this, examinations were completed. The above premises have consequently resulted in the high importation of leather materials for the production of footwear, clothes, bags etc.

In Ghana, numerous partners' particularly instructive bodies regularly trust that outfits make a more secure learning environment while understudies have said they see little contrast in the school (Reed, 2011). In the United States for occasion, school regalia rose to conspicuousness in government funded schools due to "exceptionally advertised homicides, starting in 1983, of adolescents by different youths with the end goal of taking high-status athletic shoes or coats" (Bodine, 2003). Some school heads trust that outfits can enhance teach and raise scholarly accomplishment (Stanley, 1996). Others additionally accept there is a positive connection in the middle of regalia and test scores (Bodine, 2003). Furthermore, some trust that school regalia give an impartial learning environment to understudies (Lopez, 2003). These convictions kept school uniform approaches set up for a long time.

According to Corbin (1999), it is a general practice for the secondary school uniforms to be chosen by the either the Parents' Teachers Association or the School Board of Governors at a specific school. This is no different from Ghanaian schools. Until recently, attention was only given to the dress, with students wearing different sandals and shoes to school.

In the early 60s almost every school in Ghana wore what was termed as 'Achimota' sandal which was compulsory; but in the later years, this attitude of compulsory wear of this specific type of footwear disappeared. School authorities did not bother about the type of footwear students used. To emphasize and promote this uniformity in schools, most school administrators in Ghana has introduced a uniform means of

wearing footwear by their students. This effort came as a result of improper footwear that students wore on school days. Teachers always argue with students and parents so that they could put on more appropriate footwear befitting their status as students. This gave room for the use of all sorts of footwear that did not befit the status of students. It was also seen as a demonstration of a breakdown of discipline among students.

To help overcome this situation, some schools started introducing the compulsory use of specific types of footwear that demonstrated uniformity in the schools and interestingly, many more institutions adopted this approach and unofficially have become a form of national code for wearing footwear in schools. Although there are no known laws binding on this usage, accepted regulations have been laid down as part of dressing code by various educational institutions in Ghana particularly the second cycle institutions and this effort has boosted the local footwear manufacturing industry, thus, creating job opportunities for many people.

However, the prices of this footwear manufactured by the local industry seem to be always rising and this is due largely to the fact that most of the materials used are imported. This assertion has been corroborated by Asubonteng (2010) that, ‘Observations made in such sectors as footwear, upholstery, bag making, garment and clothing accessories production and exhibition shops in Kumasi, Accra and Takoradi showed that the local leather is not a material of choice and its significance is very limited or unknown for such utility as shoe, sofas, bags, jackets, gloves, car seats, car seat backs and spare tyre covers which are commonly used by Ghanaians’; hence the massive dependence on imported leathers some of which are of low quality.

This situation quite extensively affects parents who have to buy footwear not less than twice a year for their wards. In the situation where prices are low it is realized that the manufacturers use materials that are of low quality. Thus, the situation calls for a

positive action in other not to discourage educational institutions from purchasing locally manufactured footwear; and also from discouraging parents who patronize these local products.

According to the report made by the daily graphic and myjoyonline (2014) the president of Ghana, his Excellency President John Dramani Mahama, on his visit to the Defense Industries Holding Company (DIHOC) shoe factory in Kumasi, proposed to the ministries of Trade and Industry, Education and Local Government to put programs together so that we can make shoes, sandals and footwear to accompany the school uniform for school children. This is a wonderful idea, but if the main raw material which is leather is to be imported, then the cost of production will be very high. Besides its going to solve only a minimum percentage of our unemployment problems that the president wants to address, since this will cater for only footwear producers. However, using our indigenous tanned leather for such a laudable project will help to develop the agricultural sector, the abattoir, the tanning and the footwear industries.

1.3 Philosophical Foundation of the Study

The philosophical foundation of this research is promoting made-in-Ghana goods through the use of local raw materials.

1.4 Statement of the Problem

Most educational institutions in Ghana today have made it an obligation for their students to wear sandals for most official activities while on campus particularly for class attendance. All Senior High Schools issue out students' prospectus form to prospective students. This form contains all prescribed items that are to be provided by parents for their wards. Among the list is the play deck sandal. The increasing use of such sandals has provided a huge market for indigenous leather sandals producers in Ghana and thus, has provided avenue for the growth of these small scale footwear

manufacturing industries. Considering the fact that there are about 526 public Senior High Schools, including about 200 private schools in Ghana (www.ghanaschools.net), there is a very high potential market for the footwear industry in Ghana. However, like all Small and Medium Enterprises in Ghana, the Footwear industry in Ghana is plagued by high cost of raw materials which is mostly imported.

Besides, the shortage of quality raw materials which has led to the use of inferior ones in the production of the school sandals, these situations have led many school authorities and parents in a quandary as to import the already made school sandals from outside the country or to purchase those that have been made with quality raw material at a higher cost.

This situation has arisen as a result of some of the following factors:

- The inability of the leather tanners to take advantage of the high demand for Leathers used for the production school sandals
- The lack of effort by local footwear producers to explore on the use of locally tanned Leathers in the production of school sandals.
- The government indifference in encouraging the use of local raw materials for the production of schools sandals.

1.5 Purpose of the Study

This triggered the researcher to investigate into the potentials of the indigenous tanned leathers that makes them suitable for the production of school sandals to secure quality raw materials that will not influence price increase and will also help to sustain the local footwear industry. The researcher, having studied research outcomes on leather, sees the possibility of relying on these outcomes to help in promoting the use of locally tanned leathers for production of school sandals.

1.6 Specific Objectives

- To identify the existing school sandals and the materials used for their production.
- To identify the potentials of indigenous tanned leather that makes it suitable for the production of school sandals.
- To experiment on the use of indigenous tanned leather in the manufacture of production School Sandals.

1.7 Research Questions

- What are the existing school sandals and the materials used for their production?
- What are the potentials of indigenous tanned leather that makes it suitable for the production of school sandals?
- How can the indigenous tanned leather be used in the production of school sandals?

1.8 Importance of the Study

- This study identifies the opportunities available for affordable sandals that have the quality comparable to the foreign footwear imported into the country.
- The adoption and use of the results could create employment for farmers in the animal husbandry, the tanners', footwear producers and leather accessory dealers.
- Besides, it's usage in the Senior High Schools could help reduce the importation of chrome tanned leathers at high cost with the limited financial resources in Ghana.

1.9 Delimitation

The research is restricted to the utilization of the Ghanaian indigenous tanned leather for the production of school sandals. The coverage area for the study was limited to footwear producers, tanners and schools in Ashanti region, with most respondents chosen primarily from the Kumasi Metropolis. Leather used for the experiments were accessed from Kumasi at Asawasi locality.

1.10 Limitations

The researcher did not get the needed cooperation from correspondents especially of the selected Senior High School heads and students.

1.11 Definition of Items

Soles: the down part of footwear that holds the foot to the uppers.

Bona: a synthetic material that is used to build the in-sole of the school sandals.

Templates: patterns cut out of a hard card or plastics for multiple productions in footwear.

'Micro': a rubber sole use as out-soles for the production of school sandals. **'Counch':** it is a synthetic sheet a little thicker than the synthetic leather and is used to reinforce uppers.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Overview

The following are the sub-topics treated in chapter two: Concept of leather, historical background, Types and Properties of Leather, Issues pertaining the use of indigenous leather, Types of Footwear and Footwear Industry, School sandals, Potential leathers for sandals production.

2.2 Concept of Leather in the Production of Sandals

Over the centuries, leather has been a standout amongst the most helpful and flexible materials and even utilized today to produce many items from shoes to folder cases, and even furniture. At the point when legitimately dealt with, the downplayed sheen and good looking look of the material can keep going for a generation. As per Nayudamma (2014) the uniqueness of leather lies in "Taking a gander at a live creature. The skin goes about as a tent to cover the body, bones, blood, and so on and gives the body a shape; as an umbrella against downpour not permitting water to get in; but rather in the meantime allowing sweat and sweat to get out; as a shield against barometrical conditions – wind, water, fire and miniaturized scale life forms; as a transmitter to feel, touch and as a touchy indoor regulator to control body temperature. Skin inhales – permeable, penetrable to air and water vapour with a vast surface territory and supply limit.

It is impervious to wear, tear, scraped spot, oil, dirtying, anxiety, strain and flexural exhaustion; skin repairs itself against wounds, cuts and sicknesses. At the point when the creature is dead, the skin is evacuated and the occupation of the tanner is to change over it into the leather and hold the first properties of skin with included attractive attribute Defining the concept of leather has posed a great challenge to most writers as

a result of its different properties which give the material overwhelming capacities for different uses. Consequently, efforts by writers mostly result more descriptions than definitions. The British Standard Definition of leather is 'a Hide or skin with its unique sinewy structure pretty much in place, tanned to be nonputrescible. The hair or wool may, or may not, have been shaved. It is additionally produced using a hide or skin that has been split into layers or sectioned either before or subsequent to tanning.' Leather as a material, has also been described as a strong and durable, and possesses the capacity to stretch, to be as adaptable as fabric or as firm as wood (World Book Encyclopaedia 1972).

Leather is an animal skin which has been preserved and dressed for use. It is produced using the pelts from animals, including reptile or fish which holds its unique sinewy structure and has experienced a tanning procedure which renders it impervious to decaying warm, damp conditioner. The widely used term recycled leather is misleading since in most cases the material contains only leather dust or fibers in a synthetic matrix (Walsall Council, 2015)

In any case, as indicated by British Standard if the tanned hide or skin is deteriorated mechanically or artificially into fibrous particles, little pieces or powder and after that, with or without the mix of a coupling operators, is made into sheets or different structures, such sheets of structures are not leather. In the event that the leather has surfaced coating, this surface layer, however connected, must be thicker than 0.5mm (BS: 2780).The researcher therefore sees the use of the indigenous tanned leathers which has the grain surface intact as a material for the production of school sandals.

2.3 History of Leather

Who discovered fire? Who discovered leather? It is hard to say (Nayudamma 2014). However, according whitely (2015), it would not be an embellishment to call leather

the first human industry, since the wearing of animal skins backtracks to the start of human presence

Before man ached the craft of weaving, skins of animals killed for food (with and without the hide) were used for articles of clothing, footwear, headgear, and defensive apparel, and in addition a large group of commonsense applications, and were connected to warmth and to people's extremely survival.

According to Sterlacci (2015) leather as a medium to make garments goes back to Cro-Magnon man nearly 50,000 years ago. Around that time, early humans began to migrate from relatively warm regions of the earth to the more northerly and colder parts of the northern hemisphere. Although prehistoric people learned that animal skins could be used to keep warm, they would have encountered difficulties in using untreated skins: when dried, animal skins get stiff.

Among the many discoveries made by our ancient ancestors, the preservation (tanning) and processing of animal skins was one of the most important to their survival. They did this through a variety of means, such as boiling the skins in tree bark and then salting them. Almost all preservation techniques concluded with rubbing the skins with animal fat to soften them, bending and working the skins (or chewing them) until they became soft. This would render the skins soft enough so that they could be comfortably worn and tied around the body. Later, bone tools (such as needles and awls) were developed so that skins could be sewn together to create clothing.

As far back as the fifth to the third millennium B.C., there is evidence that women wore garments made of leather in Samaria and Mesopotamia. An almost perfectly preserved gazelle skin loincloth dating from 1580-1350 B.C.E. was found in Egypt. There are also numerous references to leather found in the Bible. Tanneries were uncovered in the ruins of Pompeii. While animal skins were usually tanned for the purpose of showing

off the skin's "grain" (outer) side, eventually it was discovered that otherwise unusable skins (e.g., grain sides were scratched) could be salvaged by processing the inside of the skins. Such "inside-out" leather was the forerunner of suede.

According to Asubonteng (2010) the recognition of the leather is beyond a century old, although Leatherwork might have been introduced by trading settlers or indigenous who had existed already in areas around Salaga in the Gonja land and Yendi in the Dagomba land as a result of the Trans-Saharan Trade). Bawa (2009) however, noted that the Hausa peasant farmers or nomads from Northern Nigeria who settled in Ghana grounded the industry firmly: first in the coastal south, probably Accra, and later Kumasi, before establishing in Tamale (Hausa Zongo Majema), and then spreading into Bolgatanga, Bawku, Nandom and Pusiga. Other researchers have also added that the spread of the Leatherwork towards the north could have been upon realization that accessibility to skins and hides was easier because of the widespread of the Savannah grassland.

Asubonteng (2010) has further emphasized that since the presence of natural resources often determines the patterns and distribution of activities within a geographical zone, another factor explaining the concentration of local tanneries in the northern parts of the country is the ready availability and accessibility of Bagaruwa (*Acacia nilotica*), which serves as the chief dependable source of astringency for vegetable tanning in Ghana (Boahin, 2005). Therefore staunch in the culture of the Hausa people as handed down to their generations through apprenticeship, and creating the semblance of the Hausa-Fulani tanning methods in Northern Nigeria. There is the need for more people especially the youth to go into the production of leather to improve upon the quality and quantity of the leather to suite the production of school sandals.

2.4 Sources and Types of Leather

Leather industry relies on upon the accessibility and supply of hides and skins, which are obtained from livestock animals such as cattle, sheep, goats and pigs. Hides are gotten from large mature animals, skin are obtained from small animals while kips are skins of immature animals (Aganga and Aganga, 1985). In recent times, most leathers are made of cow skin, however numerous special cases exist. Sheep and deer skin are utilized for delicate leathers as a part of more costly clothes. Kangaroo skin is utilized to make things which should be firm however adaptable; it is the material most ordinarily utilized as a part of amazing bullwhips. Kangaroo leather is favored by a couple of motorcyclists for use in Cruiser Cowhides especially in perspective of its lighter weight and higher scratched zone resistance differentiated and leather, subsequently giving more noticeable securing if there ought to be an event of a fall on the roadway. Kangaroo leather is in like manner used for world class soccer footwear.

Leather produced using additional intriguing skins has a distinctive time in history been seen as to a great degree magnificent. Subsequently beyond any doubt snakes and crocodiles have been pursued to close destruction. In the 1970s, ostrich developing for their plumes got the opportunity to be understood, and ostrich leather got the chance to be available as a side thing. There are diverse procedures to deliver distinctive completions for some uses, i.e., upholstery, footwear, car items, frill and garments. Ostrich calfskin is viewed as one of the finest and most solid on the planet and is presently utilized by numerous real design houses, for example, Hermès, Prada, Gucci, and Louis Vuitton. Ostrich calfskin has a trademark "goose knock" look in view of the vast follicles from which the plumes developed.

In Thailand, stingray materials are utilized as a part of wallets and belts in the same path as general ox-like cowhide. Stingray leather is as extreme and sturdy as hard plastic.

The leather is regularly colored dark and secured with minor round knocks in the characteristic example of the back edge of a creature. These thumps are then regularly hued white to highlight the beautification. Cowhide apparel is likewise prevalent in Thailand. In the United States, buffalo leather has gotten to be main stream. It is utilized for gloves, coats and some mitts. It is rough however supple and has a waxy vibe. In general, leather originates from a mixed bag of different sources, including the skins of steers, pigs' goats, sheep, gators, ostriches, kangaroos, Yak. There is truly an extensive variety of distinctive leathers are utilized both for Leather pieces of clothing and additionally Leather Goods, for example, Women Totes, Gentlemen wallets, Women Totes, Cowhide Belts, Record packs and other changed leather articles.

The best by and large used leather sorts are Cow leather, Sheep leather, Wild ox leather and Bull leather. The most extravagant is Dairy animals' leather and the Wild ox leather, Bull leather and Sheep leather independently. The leather from sheep is an extremely resistant and resilient; what's more, can't be utilized for long coats, however the design of the school sandal uses small patterns and most of the patterns can be obtain from the sheep and goat skins.

2.5 Properties of Leather

The properties of the material differ extensively relying on the sort and nature of both the skins and the tanning procedure. Each bit of cowhide has singular markings which identify with its inceptions and add appeal to every skin (Carolina Leatherworks 2015). Leather is a great common natural medium which can be cut, formed, coloured, tooled, embossed, hard-pressed, plaited, engraved, sewn, burned, painted, recoloured and a great deal more (ebay,2015). Accordingly, leather can be created by anyone from a gifted skilled worker to a child included in an expressions and artworks movement in

school or church. It can be made into things that are useful, for example, dress, car upholstery, furniture, gear, sacks, totes, wallets, shoe strings, shoes, boots, belts and so on or it can be utilized for artistic reasons or as a part of a few cases possibly a blend of both.

According to Carolina Leatherworks (2015) leather must have a good tear strength. Leather has both elastic and plastic properties. It is an identification of the resistance of leather to break. Leather has a maximum of 210 kg/cm³ tensile strength. It determines to the resistance of the tear of the leather due to stitches when it is in regular use. Tear strength is 30 Kg/cm³. It indicates the resistances of leather tear in lasting through perforations, sharp angles or along seams. A certain amount of elongation without a break is necessary for pulling over on the last or other uses. For leather elongation at break is 45-75p.c. Again, leather surface do not readily conduct heat, and they are interlaced with air spaces.

Therefore, leather shoes and sandals are cooler in summer and warmer in winter than shoe made of other materials, making them more comfortable and versatile. Good leather must be hygienic for foot or their uses. Leather should adapt to the slope of the foot during fitting. It has water permeability, water vapour resistance, water resistance, perspiration resistance and thermal conductivity.

However, there are numerous impacting elements that can influence the nature of leather and in what sort of item it might be utilized. In connection to the animal's hereditary makeup, environment and sustenance supply every cover up has interesting varieties in composition and shading. These different hues, spaces, wrinkles and marks on the outside of a specific conceal or skin is a piece of its normal excellence and uniqueness. The fewer defects on the hide or skin of the animals the less completing steps should be finished by the leather skilled worker. In a premium quality hides or

skin (not very numerous flaws), the full natural grain is held and colored to improve its uniqueness. In the event that the common grain has an excess of flaws, then the normal grain is sanded away and an impersonation grain is embellished or squeezed into the hide's surface and after that colored as needs be. Much like how diverse sorts of woods are done with different sorts of colors, varnishes and even paints. Leather and woods are done in a wide range of courses relying upon the thing being delivered and how it will be utilized.

Generally as there are numerous varieties between animals there are additionally contrasts between distinctive parts on the body of an animal. Over the back the grain is generally tight while the stomach and flank zones the grain may be free and have more extend. Graining is exceptional to every individual stow away. There are various sorts of shrouds and skins, in addition to diverse medicines and procedures for tanning these stows away into leather and numerous completing strategies utilized by talented specialists to mold the leather into a wide range of sorts of leather items. In the production of leather, every tannery has its own particular techniques and formulas for making composition and shading varieties. Changing hides and skins into leather is done in three fundamental stages: pre-tanning, tanning, and finishing. The Ghanaian tanners also used these processes in the production of their leathers, but do not consider what the craftsmen are using them to produce.

2.6 Uses of Leather

Leather is a standout amongst the most helpful and adaptable materials utilized today to do pretty much everything. The leather is utilized to make artifacts. At the point when legitimately dealt with, the downplayed sheen and attractive look of calfskin can keep going for a generation.

Leather is ancient and yet modern. The caveman used it to cover his naked body.

Even today, a leather jacket and pant are the ‘in’ thing and very popular amongst the young and the old. Leather clothing has become a luxury item and prestige symbol. India exports fur coats, leather garments, garment and gloving leathers.

For defense, leather was used to make leather barges for navigating rivers; for spear shafts, bows, arrows, shields, armour for the body and head; today, leather are used for army boots, harness, clothing, gloving, belts, ammunition pouches, washers for armoured vehicles;

Leather meets industry’s needs, for example, industrial belting; textile and jute leathers, picking bands, pickers, hydraulic and pneumatic leather, packings, diaphragms, washers, railway dust shields, razor honing leathers, industrial gloves, gauntlets, leather aprons.

Sports lovers recognize leather in football, volleyball, cricket, hockey ball covers, wicket keeping gloves, grip leather and guts for tennis and badminton racquets;

To medical men, leather is a life saver – wool sheepskins as bed-pads to prevent bed sores for invalid patients; orthopedic leather for the handicapped; special protective wear for nurses, miners and others for occupational health and collagen sutures, pads and powders for surgical operations;

To the artist and interior decorator, leather is a much liked medium. Leather is used for upholstery, wall hangings, dividers; furnishing, fabrics, bookbinding covers, bookmarks; toys, ash trays, glass holders, leather puppets, paintings and leather jewelry and Specialty items like chamois leather are used for cleaning and polishing jewelry, lenses; automobiles and filtrations of aviation petrol.

In daily life, leather finds a place in sandals, shoes, ties, watch strap, purse, handbag, belts and gloves and the like. Whatever the foibles of fashion, leather will change its appearance to match the mood and the moment. The versatility and adaptability are

leather's greatest strength. These qualities are also located in the indigenous tanned leathers and can be manipulated for use in the production of school sandals

2.7 Concept of Tanning Techniques in Leather

Leather industry includes the procedure of changing over crude shrouds and skins into cowhide (tanning) for the use of man. As this is done, value continually added to the quality of the leather (Akanni and Ibraheem, 2008). According to the Midwest Research Institute (1997) calfskin tanning is the procedure of changing over crude conceals or skins into cowhide. Conceals and skins can assimilate the tannic corrosive and other concoction substances that keep them from rotting, make them impervious to wetting, and keep them supple and strong. The surface of hides and skins contains the hair and oil organs and is known as the grain side. The tissue side of the shroud or skin is much thicker and gentler. Stows away and skins are delivered to the tannery de-haired, either in a preserved dried state or in a preserved, pickled state (i.e., chemically treated with various salts, water, and sulfuric acid). These treated hides and skins are referred to as crusts. Crusts, which are dried to a board-like state, can be stored for several months before tanning.

Tanning is a process that is dependent on several factors: the type of skin, the desired end use, and the price the buyer is willing to pay. By using specific amounts of fat liquors, chromium salts, and other chemicals or vegetable tannins, tanneries can formulate a recipe that can create a soft, subtle expensive skin. Or by cutting out certain steps, they can produce a less expensive skin. Colour can be added to skins by either adding it to the drum after tanning to produce aniline skins, or for skins of lesser quality, colour can be sprayed onto the surface of the skin to produce semianiline skins. In the case of extremely poor quality skins, colour can be applied in heavier concentrations in an attempt to hide imperfections.

The regular filaments of calfskin will separate with the progression of time. Acidic calfskins are especially powerless against red decay, which causes powdering of the surface and an adjustment in consistency. Harm from red decay is irritated by high temperatures and relative moistness, and is irreversible. Introduction to long stretches of low relative moistness (underneath 40%) can make calfskin get to be dried up, irreversibly changing the sinewy structure of the cowhide. Different medications are accessible, for example, conditioners, however these are not prescribed by conservators since they impregnate the cowhide's structure relic with dynamic chemicals, are sticky, and pull in stains.

2.8 Types and Grades of Leather

The International Union of Leather Technologists and Chemists Societies (IULTCS) (2006) has identified three main types of leather namely full-grain leather or top-grain leather; Corrected-Grain leather and Split leather.

Full-Grain Leather or Top-Grain cowhide is implying the upper territory of a shroud that contains the epidermis or skin layer. It insinuates calfskin that have not been sanded, buffed or snuffed (additionally called Helped) remembering the deciding objective to clear blemishes on the hides surface. Simply the hair has been ousted from the epidermis. The grain stays in its typical state which will allow the best fiber quality, achieving more critical strength. The characteristic grain likewise has common breathability, bringing about more noteworthy solace for attire. The characteristic Full-Grain surface will wear superior to anything other cowhide. As opposed to destroying, it will build up a characteristic "Patina" and become lovelier after some period. The best leather chairs sandals are produced using Full-Grain leather. Thus just the best crude cover up is utilized as a part of request to make FullGrain or Top-Grain leather. Full

grain leather can fundamentally be purchased as two completion sorts: aniline and semi-aniline.

Adjusted Grain leathers are Top-Grain leathers that have had its surfaces sanded, buffed or snuffed to clear any flaw at first glance because of bug chomps, recuperated scars or brands. Top-Grain leather is regularly wrongly alluded to as Amended Grain. Albeit Amended Grain leather is produced using Top-Grain when the surface is revised in any capacity the leather is no more alluded to as Top-Grain leather. The hide used to make rectified leathers is covers up of substandard quality that doesn't come across the exclusive expectations for utilization in making aniline or semianiline. The defects are adjusted and a manufactured grain connected. Most Right leathers are utilized to make Pigmented leathers as the strong shade helps conceal the remedies or defects. Rectified grain leather can basically be purchased as two completion sorts: semi-aniline and pigmented.

Full-Grain leather or Top-Grain leather is inferring the upper region of a cover that contains the epidermis or skin layer. It intimates leather that have not been sanded, buffed or snuffed (furthermore called Helped) recalling the choosing target to clear flaws on the covers surface. Essentially the hair has been removed from the epidermis. The grain stays in its common state which will permit the best fiber quality, accomplishing more basic quality. Leather is less expensive on the grounds that numerous bits of softened cowhide can be part from a solitary thickness of conceal, though stand out bit of top-grain can be made.

Be that as it may, producers utilize a mixture of systems to make leather have all the earmarks of being full-grain. Case in point, in one operation, glue is mixed with one side of the relaxed cowhide, which is then pressed through rollers; these level and level out one side of the material, giving it the smooth appearance of full-grain. Latigo is one

of the trade names for this thing. Exchanged mellowed cowhide is grained leather that has been delineated into the cowhide article with the grain defying a long way from the conspicuous surface. It is not a certifiable sort of relaxed cowhide.

Once more, different business tanning industry evaluations cowhide as indicated by the quantity of flaws in the leather. Numerous tanners utilize their own reviewing framework that is specific to their own tannery. In Ghana the tanners does not follow any standard for grading their leathers aside their physical observation of the leathers to check for holes in them.

2.9 Concept of Leather Sandals

Any foot covering in the form of shoes, boots slippers or hose used for dress wear. Not necessarily synonymous with shoes which are simply being a category of footwear. Leather sandals is a light, open shoe that is hung on by straps over the instep or around the heel or lower legs, typically worn amid warm climate. A leather sandal is footwear portrayed by delicate quality and light weight. The item has been utilized by both men and ladies who basically stay in urban zones. The fundamental target clients will be the urban population. Individuals may decide to wear shoes for a few reasons, among them monetarily (sandals have a tendency to require less material than shoes and are generally simpler to develop), comfort in warm climate, and as a design decision. The word sandal gets from the Greek word sandalon. The old Greeks recognized baxaeae (sing. baxea), a sandal made of willow leaves, twigs, or filaments worn by comic on-screen characters and logicians; and the cothurnus, a boot shoe that rose over the leg's center, worn primarily by appalling performers, horsemen, seekers, and by men of rank and power

2.10 History of Tanned Leather Sandal

The word for shoe is not Grecian but rather identify with pre-Hellenic times.

Scientists' survey that; people first wore skins of animals in the midst of the Ice Age (5,000, 000 years ago). Upsetting shoes guaranteed the feet of Stone Age people from rock and thorns. The fundamental suggestion of foot spreads appeared in rock masterpieces from the late Paleolithic period (15,000 years earlier). Spanish empty delineations show individuals with creature skins around their feet. An imperative hindrance was pelts decayed and ruined away in a brief time span. Shoes were acknowledged to be the first made foot spreads and successors to primitive wrappings. The outlines were both essential and feasible. Straps or thongs associated the strong sole to the foot for protection. Two key won one included thongs fitted between the toes and the other more progressed had circles and holes along the soles' edge for joining thongs to the foot (Broby Johansen, 1968). The Soles were created utilizing for all intents and purposes anything that was available, including leaves and wood.

In Ancient Egypt shoes were created utilizing papyrus and palm leaves; rawhide was used by the Masai as a piece of Africa. Wooden shoes were made in India and rice straw was used as a piece of China and Japan. The sisal's leaves plant, offered twine to shoes in South America, while the indigenous masses of Mexico used the yucca plant. The most prepared surviving instances of papyrus shoes are appeared in the British Museum and dated at 1,500 BC.

The thong or toe strap got the chance to be specific in shoe outlining. Following improvements favored different toes, the Greeks for case made usage of the gigantic toe; the Romans, the second digit; and the Mesopotamians, the third toe. These specific, physical components were also seen and got in Egyptian statues, and this was thought to identify with celebration of diverse social orders.

2.11 Biblical History of Leather Sandals

In Biblical time's leather were utilized for bits of dress. "...Unto Adam other than unto his wife did the Lord God make pieces of attire of skin and dress them..." Genesis 3 verse 21. Lifted shoes were worn by young ladies much to the shock of their seniors. The master will take away the dauntlessness of their tinkling designs about their feet," Isaiah 3 verses 16-18. Going unshod on religious ground was totally said in the Old Testament. Moses listening to the Lord's voice where drawing closer the fuming development, at Mt Horeb was told. "Put off thy shoes off thy feel for the spot whereon thou stand is fantastic ground" Exodus 3:5. Following hardship, weepers surrendered shoes or with one shoe just, until Ezekiel was charged by God to be shod.

Shoes and shoes were utilized to do what needs to be done," ...Now this was a course in past times in Israel concerning the recovering and concerning changes for to affirm all things: a man isolated off his shoe and offered it to his neighbor and this was an affirmation in Israel." Ruth 4 verses 7-8. It was in like way standard when the mate proceeded, for the wife to marry the surviving gang. ".. By then his family's wife come unto him in the pioneers' area and loses his shoes from off his feet and spit in his face...and his name should be obtained Israel 'the spot of him that hath his shoe loosed'...." Deuteronomy 25 verse 9-10. The biblical history of sandal indicates that, sandal played a very important role between man and his maker. Some churches in Ghana today still remove their footwear when entering the church or want to talk to their maker.

2.12 Sandals in the Romans Empire

Footwear accepted a paramount part in the Roman's change Empire for not simply frame, it offer confirmation to the people who passed by boat, like the Greeks, furthermore to officers who strolled to the Empire's end. Beyond question as the domain

extended in detachment from Rome, supply lines to the stations got the opportunity to be farfetched. In this manner the Romans expected to show the shoe and shoe making claims to fame to the won. This thought by various understudies of history could be the inspiration driving why the craft of shoe making spread. Whilst the Greeks were charmed with style and tastefulness the Romans figured thongs suitable for their military activities.

The Roman Empire enhanced far past Greek limits and the locale and air conditions required more tough footwear. The Romans adjusted the Etruscan style of hobnailed footwear and the caligae gave solid, hobnailed, thick-soled, overwhelming, cowhides, shoes with an upper that went to the instep. A cross portion of delicate, cowhide strips tied around the shins or the shoes were held against the foot's growth by a tongue. The toes were left uncovered.

Amidst the Roman republic (509BC - 43AD) the stocky, solid and steadfastly taught individuals went unshod later getting a handle on lower leg boots of rawhide or cowhide which bound totally up the front including the foot. Towards the republic's end, women of value wore shoes with thick soles to make them look taller. White was perceptible however later more anomalous shading were favored. Pearls and particular valuable stones were added to finish the rich's shoe. The Ladies of Rome wore purple or green shoes whilst the ladies of Pompeii favored white, red or guided leather.

Romans started to wear an assortment of footwear between 300-27 BC. Caligae were worn by warriors up to the rank of centurion, and arrived in a couple sorts i.e. auditor for scouts; equestris for horsemen; and clavata with iron nails sticking underneath for engaging on intense ground. Exactly when Roman troopers returned triumphant to Rome they once in a while celebrated by substituting the bronze nails this held the caligae together with gold and silver tacks.

Caius Caesar Germanicus (AD 12-41) was a Roman sovereign (AD 37 - 41), generally called Caligula (or little shoe). When he was a child he lived with his father in an empowered armed force and unmistakable with his father's troopers they nicknamed him Caligula in light of the fact that he wore adolescents measured caligae. The campagus was worn by officers of high rank, the higher the shoe top exhibited the higher his rank. The Romans balanced their boots from the Gauls and just wore them in frightful atmosphere. Gaulish boots got the opportunity to be known as boots (Sunshine and Tiegreen, 1995).

A non-military caligae or sanatorium was the most cherished choice of congresspersons. Apparently the most dependable shoes were the cavatina. Primitive they were delivered utilizing one piece of bull concealment wrapped around the foot and bound over the instep. These were cut two creeps longer than the foot size and drawn up over the foot with a thong. The thong was then bound over the instep. The street shoe or calcei in like manner secured the foot and had an alternate sole and top, instep tying, which tied about the lower leg with the bundle in the back.

Patricians wore these made of rich calfskin and gold or silver decorations. The inside was a shoe worn by comic entertainers, women and ladylike men (leather Buskins or half boots were introduced in Roman Times and were worn by the disgraceful actors). Gradually this style of shoe got the opportunity to be considered as "unnatural".

Julius Caesar (101-44 BC) was represented to have bothered the senate by wearing high, gold trimmed, red boots with high heels. Red was a shading worn by the energetic and considered indiscernible for a man of his impelling years. He declared to wear them in the out of date style leaders of Alba from who proclaimed to slide from. Suetonius ensures us in his composed work; Julius Caesar basically expected to look taller.

Claudius I (10 BC-AD 54) Tiberius Claudius Drusus Nero Germanicus), was Roman head (AD 41-54), When Caligula was slaughtered (AD 41), Claudius was declared ruler by the Praetorians. Disregarding burden from a kind of loss of movement, he united and restored the space. Claudius made Messalina, his third wife, to be executed. He was in this way to the extent anybody knows hurt by her successor, Agrippina II, after she had persuaded him to disregard his youngster Britannicus as recipient for Nero, her tyke by a past mate. Claudius was entirely rebuked by his adversaries; regardless, he seems to have had amazing administrative limit. In the midst of his guideline marines were asked for to go unshod in light of the way that once a couple of marines from Ostia asked for compensation for the ruler for the strolling shoes they demolished. His answer was to disallow the entire naval force from wearing shoes.

Claudius Caesar Drusus Germanicus (AD 37-68) Claudius II was generally called Nero and wore silver soled shoes; his wife Poppaea had splendid ones. The soles were created utilizing poured gold and straps sparkled with outside layer of remarkable stones. The effect was shocking and obviously appealing. Their stallions were shod with splendid horseshoes. Nero was inferred to wear novel gold shoes the day he killed his wife by kicking her to death. In the midst of the guideline of Nero, shoemakers calm down shop and those people: requiring shoes expected to ask support from the tradesmen. Certifiable money was obliged to buy shoes and as often as possible these were supplied under the counter. Shoemakers would before long pass on the items and did all things considered by night.

This may well be the reason shoemakers have gotten reputation for being scheming. The authentic reason they did it was Nero I was purposely forming coinage from base metals and asked for the old gold and silver cash was return to his treasury. People began to gather their coinage and showy footwear was sold wrongfully. In the midst of Nero's guideline, administrators connected with or confessing to being Christian were

stripped of their purple gowns, their red bound boots removed, and their ivory stools squashed to bits.

Emperor I Lucius Domitius Aurelianus (AD 212-275) ruled for quite a while between AD 270-275) endeavored to most remote point excesses of style by refusing men from wearing shaded (red, yellow and green) shoes and allowing only women to pick materials and hues transparently. He guaranteed all power to wear red or purple for himself and his youngsters. He succeeded Claudius II and protected the area against the savages and willing rulers (e.g., Zenobia of Palmyra). One of Rome's most significant rulers, he recovered Britain, Gaul, Spain, Egypt, Syria, and Mesopotamia and restored the grandness of Rome. He was murdered, and Marcus Claudius Tacitus succeeded him.

Notwithstanding the tries of Emperor Heliogabalus (AD 218-222) to confinement women from ornamenting their shoes with gold and gems, in the more rich days of the Roman Empire, thongs were done with gold and profitable stones. Heliogabalus had his shoes composed with gems and distinctive significant stones and engraved by the finest skilled workers. He never wore the same boots twice.

But sumptuary laws and worth controls were later constrained by Gaius Valerius Diocletianus (AD 245-313), in AD 301 footwear came in various styles and tints each reflecting class capabilities. Simply male subjects met all requirements for wear gown could display the calceus which was a shoe or short boot. The calceus' shade indicated social standing. Red was at first the shading for high officers yet later transformed into the Emperor's privilege. Simply those ones in the organization of Exile were allowed to wear red.

In the midst of the tenet of Caesar Nero I (delegates connected with being Christians) was stripped of their red boots. Dim or white transformed into the favoured tints for delegates and women's calceus were ornamented with pearls and weaving and included

unobtrusive or brighter shades. Between AD 27-300 Roman footwear was an interesting distinguishing proof of social position. Officers in the midst of their triumphant strolls wore red Calcei until at last essential people were allowed to wear them.

The calceus was a sensitive shoe which had side openings and straps tying at the front. Much of the time created utilizing shaded cowhide red was favored by the respectability (dull by government authorities). The calceus came as a shoe or half boot J disguising the foot once in a while as high as the calf. Often the low shoes strapped | high on leg, and these were put something aside for Roman congresspersons wear (Calceus particus). The calceus was probably the most surely understood outdoors shoe and would be worn by men and women. It was ordinary for the Roman national and slaves were not allowed to wear them. In Rome, the calceus sanatorium was likely dull at in the first place, before getting the opportunity to be white under the late Empire.

The leg was high, with an opening inside fitted with a tongue. Its attaching was convoluted, with transversely thongs and dangling tabs. The jackasses with their red cowhide thongs were put something aside for the Emperor. A calceus' assortment had pointed toes which bowed upwards. These were broad in the Mediterranean countries, particularly Etruria, from where it went to Rome. It was worn in the East in the midst of the vast majority of the medieval times.

The Calceoulus was a lighter, wealthier calceus worn by women. The calceus' sole took after the foot's state and the upper fitted perfectly over the instep and was bound into spot with thongs fastened to the back and tied round the lower leg; a second join of straps was associated at each side of the sole and connected to the instep. Powers wore high shoe of red leather, and ladies as often as possible wore white shoe tied with shaded silk straps. Half shoes or crepida bound over the instep were furthermore worn.

The gallicae was initially from Gaul and show up in Rome in the most recent century of the Republic. The gallicae was a completely closed boot, and researchers' place them between sandals and shoes. Those muleas may have been a red or violet hued boot worn toward roman patricians who required served correspondingly as officers. Rate authors acknowledge the muleas may have been perplexed with those calceus patricius for roman legislators. Those Romans, similar to those Greeks never went into a house without removing their shoes. In the Republic, it may have been perceived ghastly direct ought to attempt barefooted in the house. They may exchange their outside footwear to banqueting shoes known as soleae, which were passed on by a worker, under their arm. Soleae were shoes developed beginning with felt, additionally required ropes from the sole which appended through those instigants. On the other hand, crepida, which may have been cowhide espadrilles, may have been worn. These were held ahead toward a strap all through the eyelets, for a broad assortment from guaranteeing fastenings. History specialists need help not done total accord Also a huge number acknowledge. Greek shoes were not worn on record they were seen concerning delineation non-devoted.

Then again others acknowledge this may have been not been the reason. Women wore soccus inside, a sort about embellished, shoe, then again calceoli. The soccus might have been a rich and enlivening slipper that seemed throughout the most recent quite some time of the development at trade with the turn needed presented fabric made for silk fiber. The bright shoe done reds, green, yellows alternately white might have been a fragile shell shape Bigelow (1970 p56). At these kinds of shoes arrived at those lower leg also required even cords, these passed through slits constructed on the instigant.

The upper from claiming lady's footwear might have been not isolated less than two pieces, like men's. Ladies shoes were settled on to red, green alternately yellow and also white. The campagus might have been sandals men wore around the house. Those peroneals needed a number variations; the senatorial style might have been constructed about bootleg leather for silver C to delegate put behind the lower leg on the heel. Ladies wore a white sandal bound with colored silk straps. This might have been called those phaeccassium.

Emperors wore shoes in the present styles However committed starting with richer materials. Women's feet were viewed as to speak to an image from claiming chastity What's more were worshipped Eventually Tom's perusing fetishists. Congressperson Lucius Vitellus kept a shoe about as much escort under as much tunic Furthermore might kiss it every now and again. This kind for fetishism, as stated by ovid for as much Ars Amandi, headed roman ladies on keep their feet under minor shoes. Prostitutes wore sandals and respectable ladies by and large secured their feet All the more completely when strolling crazy. Slaves were taboo should wear shoes and the poorest nationals wore main sandals. Criminals were constrained on wear overwhelming wooden sandals which committed it challenging to escape.

All around development, relatively minimal consideration might have been paid with fitting qualities alternately solace In spite of some of the initial sandals shown positive pairs. Shoemaking (or as sutrina) flourished and the guild about shoemakers might have been created on roman times. Shoemakers were partitioned under the individuals who generated caligarii to fighters Also sandalarii for citizen footwear. Foot rigging changed minimal throughout the majestic period from claiming roman historical backdrop throughout the early days of the byzantine domain those customs might have been received from claiming cutting the upper of the calcus under multifaceted open-work

examples thus that it got an open worth of effort shoe. There might have been confirmation from claiming straight and exited sandals.

Similarly as a sample of Exactly how genuine footwear might have been taken, head Vaspasian (69-79AD), himself those child of a shoemaker, rejected will provide for professional couriers An footwear stipend a result he possibility they Might run speedier shoeless. Presumably the mossycup oak acclaimed roman thongs at any point worn belonged with Mercury, mythical courier of the gods. As much winged thongs were known as talaria Crepida. Such as those Greeks in front of them the romans possibility shoes conveyed a lot of people implications and were not recently images about social position they were likewise viewed as beneficial luckiness charms. Suitable footwear Might conjure the great of gods what's more deflect abhorrent.

That benefactor holy person about shoemakers is St crispin Also customarily shoe shops close for St Crispins day (October 25th). He might have been destined under an affluent roman family in the third century AD, and might have been changed over into Christianity. For these days it might have been not acknowledged the one relic for respectable romans, also history demonstrates he might have been excluded. Compelled to settle on as much own possibility to get to an aggregation he turned into a modest shoe creator. He turned into a lay preacher supporting himself by settling on Furthermore offering shoes. In the end he might have been place to demise for as much convictions clinched alongside Soissons, France to 288AD. Sandals were worn outside need been discerned starting with the wearing down of steps prompting a building. Contrasted with the indoor surfaces, that disintegration may be identified with footwear. Slaves were not allowed to wear sandals they were known as 'cretin" a direct result it might have been standard to Stamp their feet with chalk at they were set dependent upon available to be purchased. The individuals for dusty feet who bring go ahead long

trudge of the commercial center were known as 'tysati' due to the tidy. To a period helter skelter priests wore exceedingly orated sandals brightened to gold what's more precious stones. Shoes on Rome turned into an prized parade. They were a mark from claiming status more than a need on stroll those lanes. Because of the prominent style about exceedingly enlivened footwear debilitated with usurp the shoemaker. Lovers might regularly preserve the shoes of their adored ones due to their innate esteem. It additionally turned into a custom for an escort on introduce her darling with the token of her shoe.

2.13 History of African Sandals

Until relatively as of late sandals were the A large portion broadly utilized footwear for Africa. The Hausa society starting with southern Sahara wore transformed dependent upon sandals. Historians need aid unsure if this might have been with protect their toe nails or similarly as an image of status. Both men and ladies of the Hausa kin painted their toe nails. The sole of sandals over Somalia were produced a few centimeters wider over the foot which kept that wearer starting with sinking under sand What's more ensured them from those singing imperatives of the ground. The layered leather soles ensured those situated from the heat, same time the upturned fronts empower those wearer to stroll more easily, with the rolling gait, with respect to sand. Sandals were worn by status in the court about Ashanti, to West Africa. Now and again leather ales were slice fit as a fiddle from claiming human figures also were brightened for wooden figures secured clinched alongside gold. Colored leather from North Africa might have been prestigious Also before long that ancient administration Egyptian joined the renowned red under their footwear. Wooden sandals for toe What's more heel stilts bring been broadly worn for Africa Furthermore Asia. Maisi sandals starting with east Africa were commonly made from rawhide. The three cornered style needed a squared off toe area with heel and thong.

Sandals worn toward those Acholi people, Uganda were likewise made from rawhide Anyway needed a sunken sole with an enormous toe circle and tarsal band. The sandals needed an additional totally sole on protect wearer's foot starting with high temp Also stony surfaces. That leather might have been decoratively for common pigments. Hides were customarily diminished with dairy animals' compost in cured the middle of layers of mangosteen tree bark. A percentage Africans sewed slip on styles previously, colorfully pigmented leathers.

Seventeenth to Nineteenth Century

Initial in the seventeenth century, those heels part might have been presented in sandals plans. In the time of the French King, Louis xv (1715-1774) a pair about shoes Might cosset to the extent that An worker required will live for a whole quite a while. For times pasquinade frequently shoes were bequeathed to parts of the crew What's more it is possibility "following clinched alongside your father's footsteps" might bring determined from this act. Sandals were not prominent throughout this time, to start with shoes afterward boots were those favored styles for footwear. But today sandal is worn by many people, especially students. This is because of the varieties in designs produced.

The Twentieth Century Sandals

The rise about Hollywood brought for it the intimacy fact those design shoe (Mazza, 1994). The sandals produced a design rebound in the nineteen twenties concerning illustration skirts got to be shorted sandals became more important. T strap sandals for high thick heels were presented in the 20s. Wedge soled assume shoes were additionally acquainted for entertainment only wear in the 30s. As stated by Bigelow (1970) shoes in the forties were heavy and clumsier. Lack about material expected the war implied there were large number inventive plans for uppers also outsoles. Shoe producer

Salvatore Ferragamo imagined the wedge heel that's more additionally acquainted a metal curve help which implied heeled shoes never again obliged to caps. The peekaboo style or toe cleavage corresponded of the improvement of the plastics business which brought about rediscovery of the style for nail painting.

Toward the thirties sandals was Perfect vehicles for demonstrating of the whole foot (O'Keefe, 1996). Those new pin dependent upon young ladies utilized this methods on parading their charms also show energetically through the Creating prevalent broad communications commercial enterprises. Whilst high fashionable shoes were recognized ordinary to the glamour set for the thirties and forties, daytime sandals which uncovered the toes were viewed as boastful.

The First World War brought a scarcity of raw materials and consequent decline in the production of fashion sandals. Italy, in the thirties also forties was the period of claiming national sovereignty to absence of hides besides other rough materials.

Sandals designers cleverly grasped different materials for example, fabric, and raffia. Other than aggravate shoe soles beginning with fitting. By and large after the people Second World War Europeans were at present included with dispersing What's more shoes uppers were created starting with felt, hemp, straw besides materials. Salvatore Ferragamo spearheaded settling investigating shoe straps starting with cellulose acidic corrosive deduction acidic destructive surmising. Additionally paper plaited with gold strings. He comparably utilized nylon string with amplification a straightforward vamp or impalpable shoe. All around the individuals 60's, sandals transformed under indeed going moreover sensible for the arriving of the act shoe. A decade later the heel might bring been over and the sandals were disturb secured nearby fascinating a few handy times made which may bring been pervasive yet every last one of exited a insignificantly stained picture. Those introductions of show up to a chance to be lespedeza striata tights offered those opportunities with fuse once more lespedeza striata

sandals. This introduced a more terrific measure tissue in addition turned under exceptionally common as a glamorous shoe.

Beginning for those in review over on the headway from guaranteeing sandals it might make certain that sandals will a chance to be a champion around the individuals practically prepared Additionally simplest sorts of foot covering which do a reversal a considerable measure about individuals a number years; An pervasive unisex footwear which might be greatly comfortable; a footwear for permitted air coursing library to those toe In addition heel In addition an footwear which serves as expressed Toward those specific necessities Likewise Concerning illustration those period camus a chance to be adjusted to the individuals assistance starting with asserting buckles.

Those initially world war brought a lack from claiming crude materials and ensuing decrease in the processing of style shoes. Italy, in the thirties Also forties might have been a period of national independence for lack of hides Furthermore other crude materials. Shoe designers shrewdly embraced different materials for example, fabric, raffia What's more plastics furthermore aggravated shoe soles from plug. Significantly after those Second World War Europeans were at present included with apportioning and sandals uppers were produced starting with felt, hemp, straw furthermore materials. Salvatore Ferragamo pioneered settling on shoe straps starting with cellulose acetic acid derivation Also paper plaited with gold strings. He likewise utilized nylon string with aggravate a transparent vamp or unobservable shoe.

Throughout those sixties, sandals turned into even Furthermore sensible with the landing of the practice shoe. An decade later the heel might have been back and the sandals were aggravated clinched alongside intriguing some good times manufactured which might have been prevalent yet all the exited a marginally discolored picture. The introduction of appear to be lesquerella tights Gave the chance with incorporate back

lesquerella sandals! This presented a greater amount tissue What's more turned into exceptionally prevalent as a glamorous shoe.

Starting with the over Audit about on the advancement from claiming sandals it may be sure that sandals will be a standout amongst those most seasoned Also simplest types of foot coating which go back a lot of people many years; a prevalent unisex footwear which may be extremely comfortable; An footwear with allowed air circulation toward the toe What's more heel What's more An footwear which serves as stated by the particular needs Similarly as the period camwood be balanced for those help from claiming buckles.

2.14 Potential Leather for Sandals Production

Practically prominent shoes Also sandals requested as of late would committed of cowhide in the same way that they have been to a long time. As stated by Hall (2015) cowhide may be even now that material about decision to its sturdiness and adaptability. Nonetheless, Asubonteng (2010), said that those indigenous tanned leather is not a material from claiming decision as far as preparation from claiming artifacts for example, footwear. Leather is precise typical as a result it breathes, giving ventilation, absorption also support from claiming stickiness. Previously, addition, cowhide manages temperature, holding warmth in the chilly and giving work to cooling through ventilation in the heat (United Gloves consolidated n. D). Numerous diverse creature wellsprings are used to aggravate leather products; Notwithstanding

98. 8% about reality cowhide handling hails from four animals, broken down statistically as takes after:

- Cow-like (Cow): 65%.
- Sheep: 15%. • Pig: 11%.
- Goat: 9%.

Every one other leather represent only 0. 2% for leather processing. Those the vast majority distinguished possibility leathers utilized for those processing of sandals (Hall, 2015 and united Glove joined n. D) are Bovine alternately cowhide leather may be the most abundant and common leather source. Cowhide may be turned out on offers most extreme esteem to texture, appearance, durability, Also solace. Cowhide may be simple with mind for, those any rate as exorbitant because of its accessibility What's more may be soil What's more water safe. Cowhide will be a standout amongst the heaviest leathers making it exact intense wearing what's more tough emphasizing a rock grain manifestation. Despite it could make to a degree stiff, leather breaks on undoubtedly. Other cowhide results cow cowhide is utilized to including outerwear, jackets, easy also biker style coats, gloves, belts, saddles, bags, furniture, straps, shoes, boots, also upholstery.

Sheep skin leather will be greatly soft, comfortable, and what's more pliable. Those finely grained cowhide is dainty and supple with a rich composition. Sheep skin leather may be lightweight, warm and fragile and also absorbs water. What's more reshapes after wearing, however it camwood misshape for over the top utilize, it will be regularly utilized on aggravate high-end leather garments particularly coats, dresses, skirts, jackets, Furthermore pants, also as, vests, slippers, handbags, hats, footwear, and blankets. These qualities of the sheep skin leather make it a material for the production of the school sandals since it low tensile strength can be controlled by reinforcing it.

Goat skin leather will be economically, solid and durable, for a smooth fine grain. Goatskin may be marginally softer also harder over cow cowhide, furthermore is lightweight, comfortable, supple, flexibility water-resistant which makes it a choice for the production of school sandals. This is because students normally wash their sandals weekly.

Pigskin leather basically utilized within settling on footballs need also exceedingly used similarly as leather utilized within those fabricate about nature footwear. The later advancement about machines that might generate enough pigskin over fitting condition hides make chrome tanned need permitted this sort from claiming leather ended up additional prevalent. An alternate angle of pigskin is that it promptly acknowledges dyes which considers it will make transformed in the totally assortment about shades necessary for ladies' shoes specifically.

Full grain side leather which is used to make the uppers for shoes is one of the most versatile of all leathers as well as being the most common. This type of leather is very durable and malleable while possessing the other desired characteristics of leather such as breathability.

Kidskin leather which tumbles the middle of calfskin What's more side cowhide also hails starting with youthful goats may be likewise utilized for that preparation of footwear. This sort from claiming leather will be for the most part utilized to exceptional personal satisfaction ladies' shoes. A regular sort from claiming kidskin leather is that which we think as suede fabric which will be made by utilizing separate concoction and common medicines.

Different possibility leather for settling on sandals may be the exotics for example, Crocodile, Ostrich, and Shark, what are more reptiles. Crocodile cowhide goes from animals legitimately farmed in the south pacific also additionally done South Africa. Ostrich likewise goes starting with ranch brought up animals furthermore would by and large delicate what's more altogether not difficult will shape. Those leathers from sharks may be a greatly safe furthermore versatile. Meanwhile the most common of these potential leathers in Ghana are the Cow leather, Sheep leather and Goat leather, which can be used in the production of school sandals.

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter deals with the research methodology and its relations to the study. It includes research design, and data collection instruments as well as identification, observation, description of the experiments conducted to determine the locally tanned leather which is best for the production of school sandals.

3.2 Research Design

The research utilized the qualitative research design as the main method of gathering data where the exploratory method of research and experimental were employed in the study.

3.3 Exploratory Research

This study is classified as an exploratory research because it identifies how a current situation of the indigenous leather can be modified to make it better for the production of school sandals. Unstructured interviews were conducted to discover the reason why footwear producers are not using the indigenous tanned leathers in the production of sandals. For the researcher to get more insight into the problem, the footwear producers were allowed to talk freely to express how they feel about the behavior of the indigenous tanned leather. More also, the topic is innovative with very little, almost nothing written on it.

3.4 Observational Research

Observational research was used in the tannery where the researcher observed how the pelts were turned into leather and describe the processes. The researcher used the participant observation which deals with the systematic observation, recording, description, analysis and interpretation of how the thickness and flexibility of the indigenous tanned leathers were improved.

3.5 Experimental Design Procedure

The researcher experimented on how to improve the thickness of the leathers obtained from skins and also manipulate the flexibility of the vegetable tanned leather from hides to suit the production of school sandals. The researcher used the experimenting approach to determine the usefulness of the indigenous tanned leather in the manufacture of school sandals by producing school sandals with the sample letters which their flexibility and thicknesses have improved. These include:

1. Reinforced Leather sandals made out of goat skin
2. Reinforced Leather sandals made out of sheep skin.
3. Leather sandals made out of cow hide.

Sample leathers were also given to the selected local footwear producers for production of school sandals and finally, sample products were given to selected schools and students for their comments.

3.6 Data Collection Method

For the purposes of this study, primary and secondary data collection sources were identified. For the primary data, unstructured interviews were conducted; here the researcher interacted with the local vegetable tanned leather producers, dealers of the finished indigenous vegetable tanned leathers, craft men who use leather to produce

artifact including footwear, traders in chrome tanned and synthetic leathers as well as producers of school sandals. Further primary sources of data were obtained as a result of researchers' observation of the production of leather and the use of leather in the production of footwear.

The secondary data collected for this study, were sourced from books found in various libraries and the internet. The relevance of the seed sources of data is expounded by Kothari (1985), where he indicated that it is essential to distinguish between primary and secondary data. Primary data are unique data gathered for the first time. But secondary data are the one that has been gathered beforehand and that has been put through the measurement procedure

3.7 Library Research

For a better overview of this research topic and to develop a good understanding of its concepts both theoretical and empirical review of literature related to the topic were used and made careful use of information from resources such as books, lecture notes, published and unpublished theses, pamphlets, the World Wide Web, academic presentations, journals and other periodicals. This led to the visit to the following libraries:

1. Main Library, Kwame Nkrumah University of Science and Technology, Kumasi
2. Reference Library, Dept. of General Art Studies, KNUST, Kumasi
3. College of art library, Kwame Nkrumah University of Science and Technology, Kumasi

3.8 Population for the Study

The coverage area for the study was limited to footwear producers, tanners and schools in the Ashanti region, with most respondents chosen primarily from the

Kumasi Metropolis.

3.9 Sampling Frame

The working experience of the footwear producers ranges between ten and thirty years, the tanners have between five and twenty years and the students have been in school for two years. The break-down is as follows:

Table 1: The population for the study

Category	Target Population	Assessable Population
Footwear Manufacturers	30	20
Tanners	8	5
Schools Administrators	5	5
Students	35	20
Total	78	50

3.10 Sampling Technique

This study applied a multiple of sampling techniques. This includes Convenience Sampling, Purposive sampling and the Simple Random sampling. The convenience sampling was used in the selection of footwear producers and the tanners since the tanners are located in the Asawasi tannery and most of the footwear producers are located in the Kumasi Asafo and Kumasi Central Market. The random sampling was used in the selection of senior high schools and the purposive sampling was used in the selection of school administrators and students, in order to get regular students for the study, the Senior House Mistresses of the selected schools were consulted by the researcher to help select the regular students.

3.11 Data Analysis

Content analysis was used to assemble both verbal and behavioral data for the purposes of classification, summarization and tabulation.

3.12 Data Collection for Research Question One

What are the Existing School Sandals and the Materials Used for Their production?

The use of sandals as uniform footwear for students in Ghanaian second cycle schools has been considered as an important action that help to achieve uniformity and moderation among students. These sandals come in common design patterns with very little variations, these are mostly in terms of color which is even limited to different shades of brown and then black. Besides, other differences may be the types of material used in their manufacture which are either chrome tanned leathers or synthetic leathers. The introduction of school sandals has influenced positively on the footwear industry, considering the huge demand each academic year. The selected footwear producers were contacted and interviewed by the researcher to identify the types of sandals they produce for the Senior High School students especially the girls.

The following are existing samples of sandals used by students in the second cycle institutions in Ghana.



(Source footwear producer at Asafo Kumasi February, 2015) Plate

1: Black Sandals for Boys



(Source: Kumasi Central Market)

Plate 2: Coffee Sandals for Boys



(Source: Kumasi Asafo Market February, 2015)

Plate 3: Brown Sandals for Girls



(Source: Kumasi Asafo Market)

Plate 4: Coffee Sandals for Girls

The pictures taken from the producers were shown to the selected school Administrators and students for their comments one particular design was accepted as a school sandals design for girls, the design in plate 3 and 4, while different designs came up for boys. Concerning colours, the school administrators accepted different shades of brown and black. Student girls in the schools selected were seen using the accepted designs by their school management.

3.13 Materials used for the Production of School Sandals

The twenty footwear producers interviewed came out with three different types of materials for the production of school sandals. These are:

Pigmented Leather

They are pure leathers with a light surface coating of pigment or clear finish. The coating increases its durability and protects it from stains, while still retaining its natural appearance and quality. The flesh side is well finished with a sanding machine to reduce bad odour drastically. According to Yeboah (a footwear producer at Aful Nkwanta,

Kumasi) the surface coating helps protect the surface colour of the leather as the students wash their sandals weekly. It is soft yet strong texture, making it hard wearing. This type of leathers is not always common in the market since it is imported and is also expensive.



(Source: Kumasi Asafo)

Plate 5: Semi-Aniline leathers for sandals production

The Aniline leathers

These are top-grain leather without protective treatment. This type of leather allows the natural leather markings to show and only soluble dyes are used. Although aniline leathers allow you to see every scar on it, it does not protect the leather from scratches, thus susceptible to surface scratches, fading and easily absorbs stains. They are also imported and are in the form of leather off-cuts. According to the producers, it is sometimes difficult to get their templates on these pieces of leathers.



(Sources: field work at Kumasi Kwadaso)

Plate 6: Aniline leather off-cuts for sandals production

Synthetic Leather

Due to the scarcity of natural leather and the increased cost of processing, leather for particular applications, synthetic materials are substituted in certain applications where leather goods had been used. Such synthetic materials have been proposed and used in the areas of footwear, upholstery, clothing, luggage making and book binding and similar applications. Because these various applications require varying physical, chemical and aesthetic qualities, different processes using different materials must be used to obtain an acceptable product which is comparable to natural leather; although in most instances these synthetics are readily distinguishable from natural leathers.

Synthetic leathers serve as a substitute for natural leathers and its preparation involves impregnating or coating a porous material, such as, cloth, with polyurethane, or a similar material. Polyurethanes have met with wide acceptance as a coating or impregnating composition due to their capability of wide variation in chemical and physical properties, particularly their flexibility and chemical resistance.

They come in large Sheets of uniform width and texture as commonly used in the textile industry (unlike natural products which sustain a substantial weight and area losses in cutting and finishing).

It is produced for versatility, for example, under a variety of exposure conditions where certain chemical treatments will assist maintenance and useful lifetime of properties (United States Patent No. US4448922A)

Synthetic leathers have about one-third of the life span of the natural leathers, cracks split much easier than real leather and become more uncomfortable over time. It is very thin and does not offer warmth, as real leather.



(Source: Kumasi Central Market)

Plate 7: Synthetic leather for school sandals

‘Couch’ is also a synthetic material whose preparation involves coating a porous material, with polyurethane; it is used to reinforce soft and lighter materials in the production of leather articles such as bags and footwear.



(Source: Kumasi Central Market)

Plate 8: ‘Couch’

Leatherworkers in Ghana, although conscious of the superior value of chrome tanned leather in terms of durability and wear comfort, yet turn to the use of synthetic leathers for the production of school sandals due to its availability, cheaper cost of raw material and affordability by customers as compared to chrome tanned leather which is largely

imported and expensive to purchase. Below are samples of synthetic leather sandals produced in Kumasi.



(source; a foot wear producer at Asafo, Kumasi)

Plate 9: Made in Ghana synthetic sandals for girls



(Source Kumasi Central market)

Plate 10:
Synthetic sandals for boys



(Source Kumasi central market)

Plate 11: synthetic sandals for girls

3.14: Reaction on the Indigenous Tanned Leathers

The footwear producers lamented on the indigenous tanned leathers as meat, ‘kawuro’ as locally called. They also complained about its hardness against lasting, lightness in terms of thickness and the pungent smell it produces.

3.15 Research Question Two

What are the potentials of indigenous tanned leather that make it suitable for the productions of school sandals?

The processing of pelt into leather and the production of leather artifacts dates several years back, Asubonteng (2010), has written that, ‘historically, it is believed that the recognition of the industry in Ghana is beyond a century old, although its practice must have been introduced by trading settlers or indigenous who had existed already in areas around Salaga in the Gonja land and Yendi in the Dagomba land as a result of the Trans-Sahara Trade’. Indigenous leatherworkers have used leather to produce several artifacts for several generations and these include different types of footwear, the leathers for their trade have mostly been secured from local tanneries across the country. However,

the three northern regions of Ghana are the most popular regions where leather tanning and production of leather artifact take place. Raw materials utilized for vegetable tanning are common tannins; which are made accessible in liquid or powder structure, acquired from different parts of plants including woods, barks, fruit and pods. The indigenous leatherworkers in Ghana and most developing countries use vegetable tannins; the pelts that are largely tanned are sheep and goat skins, cow hides are tanned mostly on request. Vegetable tanned leather has chemical and physical properties which influences it uses; these help to determine the part or type of leather that can best suit the production of sandal or any particular items.

The quality and quantity of tannins used influences tanning outcome, the high level of penetration of tannins into the collagen fibers provides effective fixation of the chemicals in the leather which determines its flexibility. Tanners always have the choice between producing soft leathers or firm leathers, these basically are determined largely by the quantity of tannins; the most common tanning technique used by Ghanaian leather tanners is the Vegetable tanning. *Acacia nilotica* which is locally known as ‘bagaruwa’ in the Hausa language is pounded in a mortar and soaked in water to extract the tannins which are used for tanning. The indigenous tanned leather produced with this tanning technique has been used over the years to produce a variety of things by local craftsmen. The source of leathers has been the Ghanaian local tanneries in some areas across the country, particularly the northern part of the country where pelt and the tannins required to boost the industry are commonly located.

It is noticed that the amount of acid and salt differs in distinctive tanning specialists and these substances extraordinarily impact the character of the leather. In the event that the salt substance is too high the resultant leather will be delicate while high acidic substance gives firm leather in the case of local tanneries. The tannins used in

indigenous vegetable tanned are natural and non-toxic, it slowly combined with the fibers, causing the fibers to swell and these fill the interfibrillar spaces. The leather that resulted from this is firm, hard, fully filled, and, in a degree, water resistant. Photomicrograph observation of indigenous tanned leather shows its larger fibers and fuller appearance, but it's less thickness when compared to chrome tanned leather. The local tanners mostly use pelt from smaller animals for their trade, this receives due to the nature of the request of their clients and majority of these animals as stated earlier are sheep and goat, the low production for hiding is due to its low and irregular demand from the clients.



(Source Kumasi Abattoir)

Plate 12: Sampled pelts for tanning

From the researcher's observation, the indigenous tanners employ tanning techniques that have been used over the years, which is from one generation to the other, and they are the following:

3.16 Pre- Tanning Processes

At the tannery the pelts are taking through the pre- tanning processes which include:

Liming: this introduction of natural acid into the pit to weakens the pores so that the fur/hair and the flesh can be removed. According to the tanners lime juice and water can be used. But the pawpaw leaves mixed with water and wood ash was used for this research.

Dehairing and Fleshing: after liming the fur and the flesh were removed using the scraping knife and the scraping board in order to get the derma for tanning.

De-liming: the washing away of excess acid from the pelts. it was done in clean fresh water basically to wash the pawpaw solution from the pelt and render the pelts ready for tanning.

3.17 Tanning

Vegetable tanning process was used for the tanning and the main tannins were obtained from *Acacia nilotica* locally known as “bagaruwa” in the Hausa language in Ghana. The seeds were pounded into powdery form and then soaked in water to extract the tannins. The tanning was done from a lower concentration to a higher concentration of the natural chemical agent.



(Source: researcher)

Plate 13: Pounding of *Acacia nilotica* for tanning.

3.18 Finishing

This is done by dyeing the leather into different colours, and then pulling to stretch out the fibers and for burnish the grain surface.

As a result of the benefits that can be derived from the use of indigenous tanned leather, Boahin (2008, Boahin, Asubonteng and Adu-Gyamfi 2013) have introduced a post tanning process commonly termed as 'secondary treatment' to help provide further preparation to the leathers to make them better applicable, resistant to fungal attack, offensive odour and excessive stretch. The process involves sanding, soaking and washing, pounding, stretching, and burnishing.

Sanding: Excess flesh was removed from the leathers using rough sand paper wrapped around a piece of wood. Besides removing the excess flesh it also reduced the thickness of the leather thereby rendering it soft.



(Source: researcher)

Plate 14: Sanding of the leather

Soaking and washing: the leathers were soaked in clean water for 20 minutes and were washed with a mild soap three times to control the offensive odour in the indigenous tanned leather.



(Source: researcher)

Plate15: Washing of the skin using the mild soap.



(Source: researcher)

Plate 16: washing the hide using mild soap.

Pounding: the hides from the local tanneries are often very hard and stiff and therefore required to be pounded to open up the fibers to soften them.



(Source: researcher)

Plate17: Pounding of the indigenous leather made from hide

Stretching: the leathers are pulled tight and held immovably with tack nails on a stretcher board, and after that permitted to dry under room temperature.



(Source: researcher)

Plate18: Stretching the leather.

Burnishing: A smooth round surface objects or bottles are used to rub on the grain side of the leathers to render the surface shiny; as friction occurs the fatty substances settle at the grain side of the leather to render the surface shiny.



(Source: researcher)

Plate19: Burnishing the surface of the leather

The indigenous tanned leathers have several common attributes that are very similar to the imported chrome tanned leathers; they are malleable and long lasting, these make them viable for application in sandal manufacturing and other fashionable products. The physical properties which make the indigenous vegetable tanned Leather significant material for utilitarian designs are: high elasticity; imperviousness to tear high imperviousness to flexing; high imperviousness to cut; great warmth, protection. Cowhide contains a lot of air, which is a poor conductor of warmth. This is an imperative solace thought. Penetrability to water vapour just like chrome tanned leather, indigenous tanned leathers hold large quantities of water vapour; ability to absorb perspiration, which is later dispersed, a critical variable in relief.

The following are further attributes identified with indigenous vegetable tanned leather; Indigenous tanned Leather has elastic and plastic qualities and can be moulded and will retain its new shape. Indigenous tanned leather is warm in cold and cool in warm seasons; they leathers have high maintenance abilities and resists wear and tear; it is also inherently resistant to heat and flame; resistant to fungal attack, decay and chemical attack. These indigenous leathers are tanned and dressed through the secondary treatment to resist these harmful chemicals.

The commonly known problems found with indigenous tanned leathers are offensive pungent smell it emits, the susceptibility to fungal attack, and the possibility of dyeing them into several colours. These problems among others have not made the use of the locally tanned leather appreciable for use by many present day footwear producers for the production of modern footwear, among which are school sandals.

However, these problems have been researched into to help alleviate them for use in the production of modern items such as footwear of diverse kinds.

3.19 Thickness of Leather Assessment

Sampled chrome tanned leather which is accepted by the footwear producers as suitable for the production of school sandals was measured using the micrometer and then different kinds of the Ghanaian tanned leathers selected from Kumasi tannery was also measured for comparison.

Micrometer: It is the tool used for measuring the thickness of materials such as leather.



(Source: researcher)

Plate 20: Measuring of leather using the micrometer.

3.20 Flexibility Assessment

This is the leather's ability to be bent in any direction without damage to the core fabric. It can be flexibly from top to bottom, side to side and grain to grain out because there are no weak links in its internal structure. All the sampled leathers were physically eased by bending them in different directions and compared them to the accepted chrome tanned leathers.

Porosity: It is the ability of leather to absorb and transmit moisture. Leather has pores that absorb moisture when the sandal is washed and transmits moisture during air drying. The indigenous tanned, just like the aniline leathers absorbs and transmit water.

3.21 Experiment for Research Question Three

How can the indigenous tanned leather be used in the production of school sandals?

3.22 Improving the Flexibility of the Hide

Due to the manner and rational behind the processes applied by local Ghanaian tanners for tanning hides and skins, the finished leathers do not usually attain the quality required for making certain products such as sandals as compared to the imported chrome tanned leathers. In the light of this the researcher sees the need to enhance the material in order to make it flexible or applicable for the production of the finished work.

Experiment 1: The Use of Potassium Alum

Potassium alum is the hydrated type of potassium aluminum sulfate and has the synthetic recipe $KAl(SO_4)_2 \cdot 12H_2O$. However, any of the composites of chemical with the empirical formula $AB(SO_4)_2 \cdot 12H_2O$ are considered to be alum (Anne Marai Helmentine, 2015). It sometimes comes in crystalline form, although it is most times

sold as powder. The types of alum include soda alum, ammonium alum, chrome alum and potassium alum.

Chemical Properties of Alum

1. Alum breaks up in water
2. Alum has sweetish taste
3. Respond corrosive to litmus and create in normal octahedral.

As per Pliny, (2015), when alum is warmed it condense and when warming proceeded to the crystallization's water is driven off, salt is froth and swells, and finally an amorphous powder remains it is a stringed and acidic. For the purpose of this research potassium alum, which is very common on the market was used. 600g of potassium alum and 12g of sodium chloride were soaked in 2 liters of water and a portion of the leather from the butt part which is capable of producing a pair of sandals was soaked in it for 24hours. The hide was later stretched and dried under room temperature.



(Source: researcher)

Plate 21: Improving the flexibility of the indigenous hide using alum.

Experiment 2: The use of *Acacia nilotica*

Acacia nilotica which is mostly found in the northern part of Ghana locally known as ‘bagaruwa’ in the Hausa dialect was used. It is known to be the main material for the preparation of vegetable tannins in Ghana. 1000g of Acacia nilotica was pounded in the mortar and soaked in two Litres of water for 24 hours with a piece of hide that is capable of producing a pair of sandals. The hide was later stretched and dried under room temperature.



(Source: researcher)

Plate 22: Improving the flexibility of the indigenous hide using Acacia nilotica.

3.23 Production of School Sandals by the Researcher

The researcher went through the production processes used by the footwear producers in producing the school sandals. Aside the indigenous tanned leathers, the researcher used all the materials needed for the production of the sandals.

Parts of school sandals: the researcher used interviews in identifying the various parts of the school sandals. According to the footwear producers, school sandals consist of an insole, outsole, midsole, heel and the uppers. They are the basic parts of a sandal that are mostly included in all types of sandals.

Insole: the interior bottom of a sole which sits directly beneath the foot. In most of the ladies school sandals the footwear producers use PVC product called ‘Bonner’

Midsole: this is the layer that lies between the insole and the outsole. It is a wooden board that gives support to the insole to last long.



(Source: researcher)

Plate 23: The insole cut out of ‘Bona’ with the supporting board as mid sole.

Outsole: The layer of the sole that has the direct contact with the ground. In the production of school sandals, most of the producers use synthetic sole called “micro” while others use the thick boner. In this research micro was used.



(Source: researcher)

Plate 24: the outsole made out of 'micro'

Heel: the rear part at the bottom of the sandal is the heel. It supports the heels of the feet. Heels of school sandals are made from boner or used conveyer belt.



(Source: researcher)

Plate 25: A used conveyer belt as a heel

Upper: it is the upper part of the sandal which helps in holding the sole to the foot. This research focuses on this part of the sandals where different kinds of indigenous leathers were used.

3.24 Tools and Materials for the Production of School Sandals

The main materials required are leather, lining, and 'couch', sewing thread, tack nails, adhesives and soles. The basic tools for the production of school sandals are the cutting knife, scissors, drive punch, punch seat, hammer, pencil, templates, brush, plier, iron last, last, etc.



(Source: researcher)

Plate 26: Basic tools for the production of sandals

3.25 Templates used in the Production of School Sandals

These are made out of metal, plastic, thin or thick boards which are used as a pattern for cutting leather in the same shape for mass production. These are prepared when there is the need to reproduce an article and they help in accurate cutting and prevent wastage of materials. In the production of school sandals for girls there is an approved pattern for almost all the Senior High School Administrators in Ghana.



(Source:

researcher)

Plate 27: Approved templates for school sandals.

3.26 Last

A plastic or wooden shape that stimulates the foot shape was used to mold the uppers of the sandals to the insole. They come in sizes to produce different sizes of footwear.

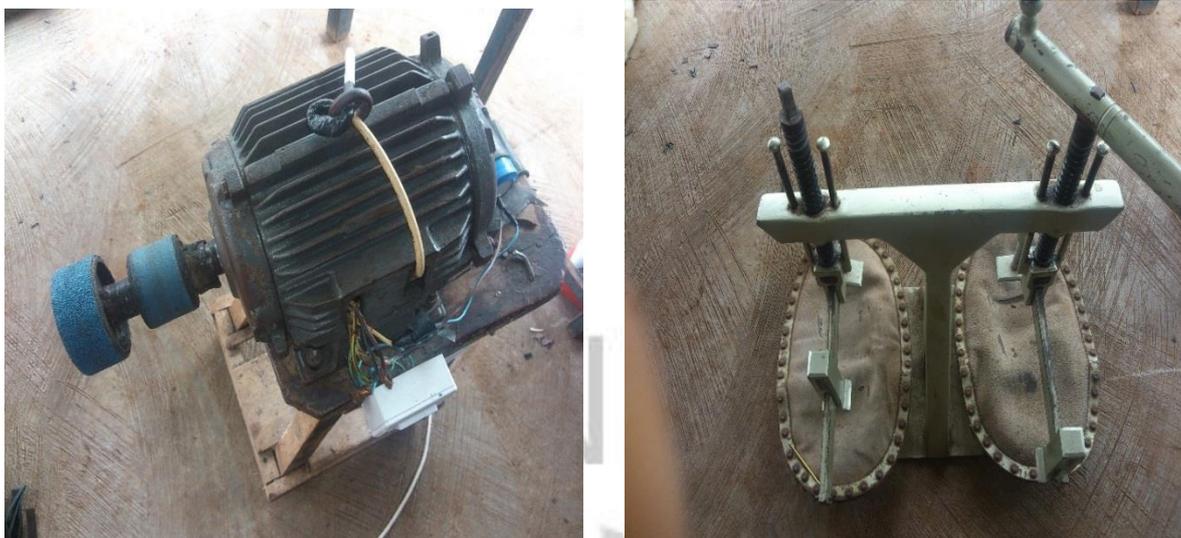


(Source: researcher)

Plate 28: Last used for molding the sandal.

3.27 Machines

The production of the school sandals requires machines such as the sewing machine, pressing machine and the polishing machine.



(Source: researcher)

Plate 29: Sanding and the sole pressing machines

3.28 Fasteners

They are devices, metal, leather, plastic or fabric used for closing and opening of leather articles. They can be in the form of metal such as buckles, press-studs, etc. or fabric such as zips, Velcro, etc. or leather example toggle and loop, and draw string.

For this research, buckles and reverts were used.



(Source: researcher)

Plate 30: A pair of buckles and a the tabular reverts

3.29 Computer Design of the Sandals

Three dimensional computer software specifically Rhinoceros were used to design the approve school sandals by the school administrators and rendered from different angles.



(Source: researcher)

Plate 31: Computer aid design of school sandals

3.30 Production Process of School Sandals

The indigenous tanned leathers after the experiment were taken through the production processes.

Experiment 1: Using the hides

The production procedure of leather sandals first includes marking and cutting the upper patterns from the leather. The sampled leathers made out of hides from Kumasi tannery were marked using the templates of the approved designs by most of the schools and were cut using scissors. The various shapes that take the form of the uppers were carefully cut. This operation needs a high level of skill as the materials are not to be wasted.



(Source: researcher)

Plate 32: Marking of leathers using the templates of the approved designs.



(Source: researcher)

Plate 33: Cutting of patterns marked.

Assembling of the Uppers

The different patterns were joined together using the fasteners, for the two belts were joined to form the back with the tabular reverts while the two parts that form the vamp were also join together with the buckle. Another pair of buckles was also fixed at the ends of the back in other to buckle the sandals when worn.



(Source: researcher)

Plate 34: Assembled uppers

Cutting of Soles

The insoles were cut first out of the boner and were reinforced with a wooden board.

Holes were then created at the position where the uppers are to be fixed.



(Source: researcher)

Plate 35: Reinforcing the insole with the midsole

The outsoles: The outsoles on the other hand were cut out of micro and the heel part was reduced and roughed in order to fix the used conveyer belt at the heel part of the out sole. With the heel the used car Tyr which has been treated to be used as heels for footwear was used. Adhesive was applied before fixing and tack nails were used to fix them permanently.

The conveyer belt to be used as heel.

The outsole



(Source: researcher)

Plate 36: The out sole and the heel to be joined



(Source: researcher)

Plate 37: A finished out sole with the heel.

Lasting: it is the processes of molding the uppers to the insole of the footwear using the last. Adhesive was applied on both the leather for uppers and the insole and allow drying application of adhesive was done on the second time and allow drying, after which the upper was stretched and molded over the last and attached to the insole. The part of the uppers that are glued down was then skived with a skiving knife to take off the smooth finish in order for it to adhere to the outsole.



(Source: researcher)

Plate 38: Adhesive applied to insole and uppers for lasting



(Source: researcher)

Plate 39: Uppers glued down to the surface of the insole.

Fixing of Insole to the Outsole: after roughing the surface of the uppers which was attached to the insole, adhesive was applied to both the insole and the outsole twice and allows drying. The insole was then fixed on the outsole starting from the heel side of the sandals and the other end was fixed before fixing the middle part.



(Source: researcher)

Plate 40: Identifies the outsole and the insole on which adhesive has been applied and are ready to be joined together



(Source: researcher)

Plate 41 Fixing of the insole to the out sole

Pressing of Insole to the Outsole

In order for the insole to adhere perfectly to the out sole, a pressing machine was used to press the two together using the last. This was done by putting the sandals with the last in it on the seat of the pressing machine and the handle was turned clockwise to press and anticlockwise to release it.



(Source: researcher)

Plate 42: Pressing of the insole to the outsole

3.31 Finishing and Packaging

The last production stage includes cleaning, assessing and packaging. Sanding was then done using the footwear polishing machine to render the soles smooth using both rough and smooth sand papers. Inspections were then done to remove excess materials and then polish using the neutral solid polish. The finished products were then packaged in a plain rubber with perforated holes for leather breathability.



(Source: researcher)

Plate 43: A finished ladies sandal made with a tanned hide which have its flexibility improved using potassium alum.



(Source: researcher)

Plate 44: A finished sandal made with a tanned hide which have its flexibility improved using *Acacia nilotica*.

Experiment 2: using the Skins: the production of school sandals with the skins went through the same processes just like the hides as in experiment 1. But because the thickness is far below the standardized thickness as indicated in research question two, the leathers were reinforced with ‘couch’. It is used by most producers for reinforcing light and soft leathers including the synthetic materials.

3.32 Reinforcement of Skins

Reinforcement is attaching of a bit thicker material to the leathers made out of goat and sheep skins in order to increase the thickness of the product and also give it more strength. After the various patterns were marked on the leather, adhesive was applied on both the leather and the ‘couch’ and allow drying, after which the leather was placed on the couch and pressed firmly to get rid of air bubbles.



(Source: researcher)

Plate 45: Reinforcing leather made from the sheep and goat skin

After gluing, all the patterns were cut with the ‘couch’ under it. Since two different materials were put together, a sewing machine which is use in sewing leather product was used to sew them together.



(Source: researcher)

Plate 46: Sewing of the leather to the 'couch'.

After these two processes, fasteners were fixed and the rest of the production processes in the experiment 1 were followed to finishing.



(Source: researcher)

Plate 47: Assembled uppers of the goat skin.



(Source: researcher)

Plate 48: Finished sandals made with sheep skin.



(Source: researcher)

Plate 49: Finished sandals made with goatskin.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Overview

This chapter deals with the presentation and discussion of results as well as the findings made in this research. It also concentrates on the outcomes and discoveries of the various activities performed during the study, which includes, interviewing, observing and experimenting of work for research objectives one, two and three which seeks to investigating the potentials of indigenous tanned leather in the production of school sandals for use by senior high schools in Ghana.

4.2 Results for Objective One: *The Existing School Sandals and the Materials used in their Manufacture*

4.2.1 The Existing School Sandals in Ghanaian Schools

Upon studying the uses of footwear in Ghana, the researcher found out that most students in Ghanaian schools use sandals when going to school. In the case of second cycle institutions it has been considered as part of a student's uniform, such that every student is made to buy a pair the moment he or she enters school. Sandals according to Khorshed (2001), consist of an insole with the upper having straps across the vamp portion with flat or high heels. A belt passes round the heel to keep the foot in the position of the buckle arrangement. This definition fits the sandals seem to be used by Senior High School students', particularly among the female students. However, they were mostly flat heeled as recommended by the school authorities as in plates 1 to plate 4 and plate 9 to 11 under the research question one. The researcher's inquiry revealed that most school authorities have taken this decision for some of the following reasons; to achieve uniformity in students dressing, to promote moderation among students, and

to secure the most durable footwear for use by their students, comfort of use and to attain smartness in movement. The nature of sandals indeed serves the purpose and aspirations of school authorities. It was found out that the design of the picture in plate 4 is accepted by all the selected School Administrators for girls with colours ranging from shades of brown to black, while different designs were there for boys. The researcher identified students wearing the approved sandals by their school administrators. The acceptance of this design as indicated is due to the open spaces around the footwear allows adequate ventilation and thus prevent foot rot and other diseases.

4.3 The Materials used for Producing School Sandals

The researcher identified three different materials which are, the Semi -aniline leathers, Aniline leathers and the Synthetic leathers;

Table 2: Result on the materials for the production of school sandals from the producers

(20 footwear producers who have the working experience in the footwear production ranges between ten and thirty were used)

TYPE OF MATERIAL	NUMBER OF PRODUCERS
Semi-aniline leathers	11
Aniline leathers	6
Synthetic leather	3

(Source, interviews conducted by the researcher)

Results of table 4.2 indicate that, majority of the school sandal producers prefers the use of the pigmented leathers followed by the Aniline leathers and the Synthetic leathers due to their qualities and durability.

Pigmented Leather as the first choice for the Production of School Sandals

The researcher found out that, leathers that are used for sandals production are all imported into the country and are expensive due to high import duties and taxes. The researcher identified the semi-aniline leathers as the preferable leathers for the production of school sandals, as found in table 2. This is accepted because it is soft yet strong textured and the surface coating protects the surface colour.

Aniline Leathers as the Second Choice for the Production of School Sandals The aniline leathers are the second preferred leathers which are also used in the industries where there was no Semi-Aniline Leather; the aniline leather is the topgrain leather without protective treatment. This type of leather allows the natural leather markings to show, susceptible to surface scratches, fading and easily absorbs stains. The producers emphasized that, the cost of a kilogram of an imported natural leather which can produce no more than three pairs of sandals ranges between 45 and 50 Ghana Cedi's, which makes the final product very expensive. Meanwhile the average size of leather from a goatskin, which produces between 7 and 10 pairs ranges between 8 and 12 Ghana Cedi's

Synthetic Leathers as the Substitute Material for Pigmented and Aniline Leathers for the Production of School Sandals

Synthetic leathers were also identified by the researcher as a substitute for both semianiline and aniline leathers due to the scarcity of natural leather and the increased cost of processing leather. As stated by the students, 'even though the sandals produced out of the synthetic leathers are affordable, the life span of the synthetic sandals is one third of that of the natural leather sandals in terms of quality of uppers. It was observed that, the synthetic leathers are lighter in thickness and are reinforced to make it strong.

4.4 Reactions of Footwear producers on the Indigenous Tanned Leathers

The researcher found out that the footwear producers identifies the indigenous tanned leather only as meat and not for the production of footwear. It is hard, too light, and has a pungent smell were some of the comments received.

4.6 Result from the Investigation of the Materials for the Production of School Sandals from the Students (20 students were use, four students from each school)

Table 3: Result on the Materials for the Production of School Sandals from the Students

TYPE OF MATERIAL	NUMBER OF STUDENTS
Natural Leather	13
Synthetic Leather	7

(Source, interview conducted by the researcher).

It was comprehended that most students preferred the natural leather sandals, but due to the high cost of acquiring it some students resorts to the use of the synthetic ones. According to the students, the life span of the natural leather sandals is three times that of the synthetic sandals.

4.5 Results for Objective Two

The potentials of indigenous tanned leather that make it suitable for the production of school sandals

The research unveiled that indigenous tanned leather has been used severally to produce a variety of items and that the tannins used for these items have largely been obtained from plant sources. Among these items are traditional footwear of different kinds and these are made across Ghana. The three northern regions are the most popular parts of

the country where footwear is largely produced with natural leathers. The research demonstrates the availability of adequate pelt locally to take care of the need of the local industry, and here, Asabere (2010) has indicated that the local abattoirs in the major cities and towns across the country produce large quantities of pelt each day as a result of the animals they slaughter each day, and that Asawase local tannery acquires 81.8% of its pelts from Kumasi abattoir and 18.2% from other towns outside Kumasi.

The research further unveiled that indigenous vegetable tanned leathers have several common attributes that are very similar to the imported chrome tanned leather; they are malleable and long lasting, these make them viable for application in sandal manufacture and other fashionable products. Different properties that pass on the possibilities of vegetable tanned leathers are high rigidity, Resistance to tear; high imperviousness to flexing, cut and great warmth protection. Further physical study of the thickness of indigenous tanned leather revealed that it has varied scales that make it easier for leather workers to identify the type that would best be suitable for the production of school sandals.

4.6 Leather Thickness Assessment Results: after measuring different kinds of leathers using the micrometer

Table 4: Leather thickness assessment results

TYPES OF MATERIALS	THICKNESS
Imported leathers (chrome tanned)	0.44mm
Cow hide leather	0.42mm
Goat skin leather	0.25mm
Sheep skin leather	0.23mm

Table 2 indicates that the local leather is lighter in thickness than the chrome tanned leathers accepted by the footwear producers for the production of school sandals, since none of the pieces assessed with the micrometer measured up to the standard millimeters which is 0.44mm measured by the researcher. As stated by Anini (2011) there is the need for reinforcement of the skins, the leathers from the skins were reinforced. Meanwhile the hides were almost up to the standard thickness and were used for production without reinforcement.

4.7 Flexibility Assessment Results

During the physical examination, it was observed that, the flexibility of the skins were like the chrome tanned leather while the head was harder. The researcher found out that the quantity of the tanning material used for the production of the hide was not enough, therefore the tannins were not able to penetrate into the collagen fibers of the leather to loosen it to flex.

4.8 Results for Objective three

Experimenting on the use of indigenous tanned Leather in the Production of school sandals.

As stated in objective two, the tanned hide was not as flexible as compared to the chrome tanned leather. This led the researcher to improve the flexibility nature of the leather by conducting subsequent experiments to alleviate the problem.

Result of experiment 1: The Use of Potassium Alum: Alum the main chemical for alum tanning was identified as a chemical for tanning white and soft leather with its properties as dissolving in water, having sweetish taste, reacting to litmus, developing in regular octahedral liquefies when heated and turns to powder (Pliny, 2015). It was

discovered after experiment that, the flexibility of the leather has improved. The leather was then able to undergo the production -processes of sandals without difficulties.

Result of experiment 2: The Insufficiency Use of Acacia nilotica: by physical examination the researcher found out that the latter became more flexible than the original tanned leather, this confirmed the researcher's finding's in objective to that, the tanners are not using the right quantity of the chemical for the production of the hide.

Comparing leathers from the two experiments: when the two leathers were physically observed it was realized that, the one which was tanned with greater quantity of Acacia nilotica became more flexible than the one tanned with alum. This is due largely to the activities involved in the secondary treatment of leather where most of the alum gets washed off since alum has the chemical properties of dissolving in water.

4.9 Production of School Sandals by the Researcher

Parts of a School Sandals: the researcher identified the parts that form a sandal as the insole, midsole outsole, heel and the upper. The material used for these parts are Bonner, wooden board, micro, used conveyer belt and leather respectively. Some basic tools, materials, machines, fasteners and fittings used in the production of school sandals were also identified. Templates for the patterns of the designs accepted by the school administrators were cut to mark out the designs.

Results from Experiment 1: production of sandals using Hides: The steps of production were followed by the researcher to produce the sandals; it was found out that the proper application of adhesive is required before lasting to enhance the durability of the sandals especially between the leather and the insole. Besides, the

researcher observed during the lasting that, the hide was able to resist the stress of pulling it over the last into the insole especially at the vamp area. Fixing of insole to the outsole was done by applying the adhesive twice and allows drying. The researcher found out that, insoles fix properly to the outsoles by the use of the sole pressing machine instead of hammering it with a mallet.

Results from Experiment 2: Production of sandals using the Skins: The leathers in the experiment two were improved in thickness after the reinforcement. The thickness of the goat skin was increased from 0.25 to 0.43 while the sheep skin was increased from 0.23 to 0.41 which is almost up to the standard of the imported chrome tanned leather used for the production of school sandals. The machine stitching also made the reinforcement permanent. Lasting the leathers from the skins was comfortable due to its flexible nature.

Finishing and Packaging: the researcher found out that the footwear sanding machine gives the sandals very smooth and sharp edges to make them presentable in the market since the soles are not dyed to change its color. The packaging was done in a perforated rubber container to allow for breathability

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Overview

This study investigates the potentials of indigenous tanned leather in the production of school sandals for use by senior high schools in Ghana. The chapter deals with the summary, conclusions and the recommendations of this study.

5.2 Summary

A greater percentage of students in Ghana use sandals for class attendance and other formal gatherings. In the case of second cycle institutions it has been considered as part of a student's uniform most especially the girls. Meanwhile the materials used in the production of these sandals are imported which makes the finished product expensive for students and parents to afford. Surprisingly, the leathers used for the production of free sandals for basic school students by the government are also imported. However, the indigenous tanned leathers can be used in the production of these school sandals.

The literature was reviewed on the following sub-topics: Concept of Leather, History of Leather, Properties of Leather, Types and Grades of Leather, Factors affecting the use of Indigenous Leather, Leather Sandals, and Potential leather for sandals production.

Observation, descriptive and experimental research designs were conducted to identify the existing imported chrome tanned leather and synthetic leathers used by school sandals producers, and research conducted to enhance indigenous tanned leather's potentiality of being used to produce school sandals.

5.3 Conclusions

1. Most Senior High School Administrator's in Ghana have accepted the play deck sandals as part of their school uniform for their students to achieve uniformity and promotes moderation in the students dressing. The preferred materials for the production of these sandals are the pigmented leathers and the aniline leathers. Synthetic leathers are sometimes used due to its affordability and availability in the market and most footwear producers do not accept the use of the indigenous tanned leathers as a material for the production of school sandals.
2. The indigenous tanned leathers are utilized in the production of several items including the traditional footwear across the country. These leathers have some common attributes with the imported chrome tanned leather and are also available for the production of school sandals However, the footwear producers complained of limitations in thickness, flexibility and the offensive odour it gives. The researcher was able to improve the thickness of the skins by reinforcing them, the flexibility of the hides was also improved using *Acacia nilotica* and Potassium alum and the offensive odour removed through the secondary treatment.
3. The research has unveiled that alum has the potential to soften leather when used for tanning, but the insufficient use of *Acacia nilotica* contributes to the non-flexibility of indigenous tanned leathers. The researcher concluded that, the adequate use of *Acacia nilotica* can be more reliable to attain flexibility as compared to alum. The research also unveiled that when indigenous vegetable tanned leather is given a required treatment to attain flexibility, local footwear producers can use it to produce quality school sandals in the same manner they do with the imported chrome tanned leather or synthesis leather.

4. This research supports the theory that, ‘leather is still the material of choice for its durability and adaptability.’ Hall (2015), which includes the indigenous tanned leathers. The study establishes the theory that, the secondary treatment of leather helps to emit the bad odor from the indigenous tanned leathers Boahin (2008, Boahin, Asubonteng and Adu-Gyamfi 2013).

5.4 Recommendations

The small and medium scale industries in Ghana contribute greatly to the economic development of the nation and improving them can also add more value to the economy of Ghana. It is therefore recommended that:

1. Seminars and workshops can organize for the producers of school sandals on the properties of the indigenous tanned leathers that makes them a required material for the production of the school sandals.
2. Footwear producers should patiently go through the secondary treatment of leather before production to increase the tensile strength and emit the bad odor. They can also reinforce the goat and sheep leathers to increase its thickness as they do with the synthetic and some aniline leathers.
3. The indigenous leather tanners should increase the quantity of the chemicals (*Acacia nilotica*) used in the production of hides to improve its flexibility so that the footwear producers can use them in the production of school sandals. Tanners can also be supported financially by the government to produce more sheets of leathers for footwear production.
4. The government of Ghana should encourage the use of local raw materials for the production of schools sandals. This can be done by making it a requirement for the contractors producing the school sandals for basic school children to use the indigenous tanned leather.

KNUST



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APPENDICES

Appendix A; interview guide for footwear producers.

Objective; to obtain data on the types of school sandals and materials use for their production.

1. What type of footwear do you produce and why?
2. What are the materials use for their production?
3. What type of leather do you use for the production of the uppers and why?
4. Can you use the indigenous tanned leather to produce the same footwear and why?

Appendix B; interview guide for the School Administrators

Objective; to acquire data on the more accepted designs and colours of sandals in the selected schools

1. What prescribed footwear do you have for your students?
2. What kind of design do you prefer?
3. What are the accepted colours?
4. What type of material is prefer for the production of your selected design?
5. Can you accept the indigenous leather sandals?

Appendix C; interview guide for students

Objective; to acquire the preferred materials by students

1. What type of footwear is prescribed for you to wear to school?
2. What type of design and colour?
3. Which type of material do you prefer to be use in the production of your sandals?
4. Would you wear a footwear produced with the indigenous tanned leather?

Appendix D; observation guide at the tannery Objective;

to follow the systematic processes of tanning.

1. Observe the pre- tanning processes.
2. Observe the preparation of tannins.
3. Observe the duration of tanning.
4. Observe the post-tanning processes.
5. Describe the processes observed.

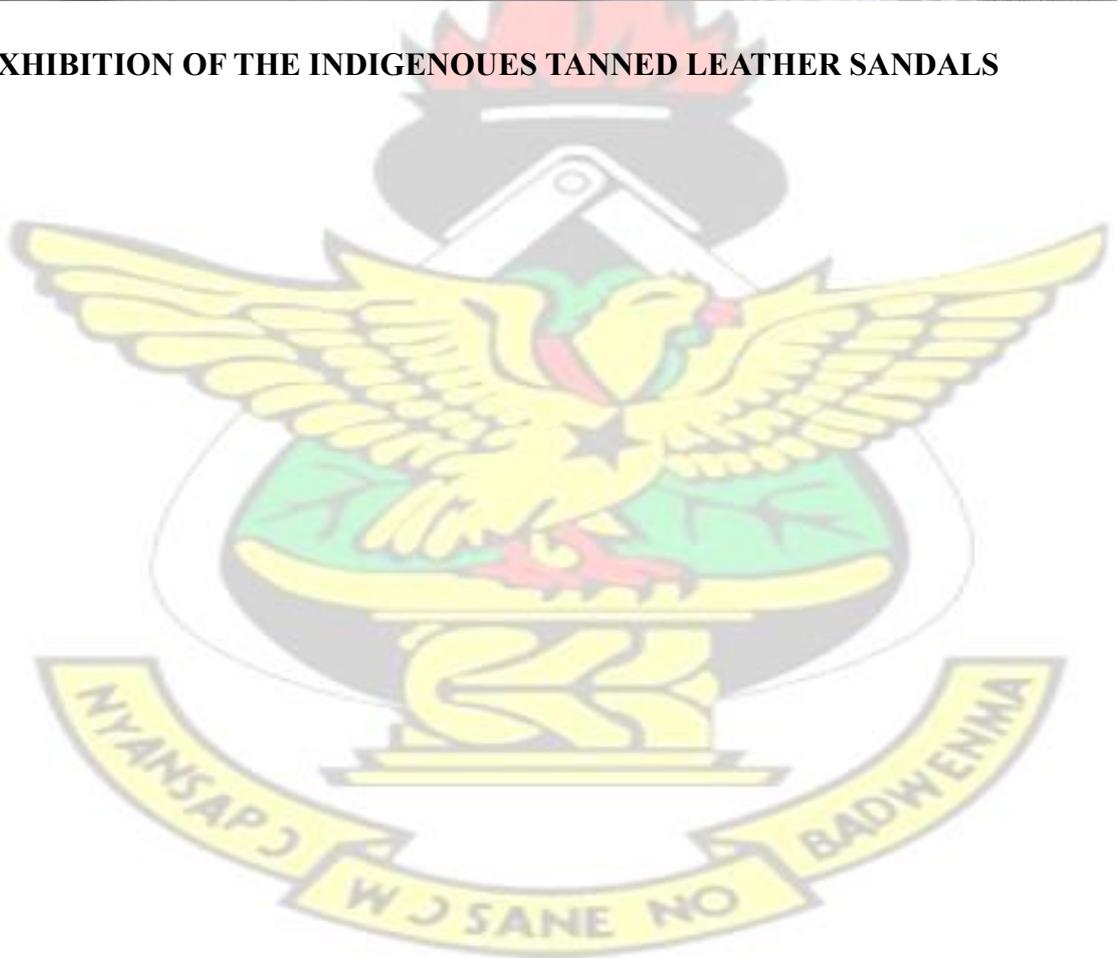




SOME OF THE FINISHED PRODUCTS



EXHIBITION OF THE INDIGENOUS TANNED LEATHER SANDALS



KNUST

