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Exploring Ghana's Indigenous Metalworks By Using Chasing And Repousse Techniques

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Abstract

This study sought to produce an educational map on jewellery and metalworks indigenously produced and used in Ghana. The main objective of the study was to trace the history of indigenous jewellery and metalworks across Ghana through which civilisation of current trend of jewellery and metalworks started and accentuate them using chasing and repousse techniques to serve as an educational material for metal and jewellery industry. Studio-based research and descriptive survey approaches were used to highlight the procedures and methods used in the production. The study purposively sampled 80 metalwork workshops of which 4 respondents each amounting to 320 was used for the analysis. A total of twelve (12) individuals with 2 each from Centre for National Culture in Accra, Kumasi and Wa, Ghana Tourist Authority in Accra, Kumasi, and Wa respectively were also part of the sample for the study. The study adopted interviews and observation as the primary data collection instrument and books, magazines and journals as secondary data collection. The study discovered little or no knowledge of jewellery and metalworks documentation among some of the regions. Most metalwork productions are inherited skills handed over from parents. Utensils and farm implement dominate metalwork production across the country due to the nature of employable skill in the informal sector of the economy. The techniques that ensured the production of the indigenous metalworks were casting, forging, goldsmithing and blacksmithing. The study recommended educational materials and artworks that are fully dedicated to bringing to light the true identity and nature of metalworks and their philosophical values that embrace the trends and development of the jewellery and metal art industry. It also stresses the significance of chasing, repousse, and embossing, among others as fundamental techniques clearly defined in projecting jewellery and metalworks. The study recommends research on new trends in metalworks and its applied technology in Ghana.

Keywords: Chasing, Fabrication, Indigenous, Jewellery, Metalworks, Repousse, Techniques

1.0 Introduction

It is important to note that different kinds of metal are used in producing different items which are peculiar to each region in Ghana. Suffice to say, each region in Ghana has a very good history of metal and its works that must be made known across the length and breadth of this country. The study seeks to a very large extent address this in the area of academic work by tracing the history of jewellery and metalworks and how significant they are to each region. With all these factors at play, the researchers deemed it essential to interpret the outcome of the study with a fabricated metal decorative piece that aligns with the Objective of the study and which will serve as an educational document in our community.

Ghana is known for its rich mineral resources such as gold, bauxite, clay, glass and other metals that play a major role in metal product designs (Ayensu, 1997). Various metals and their related work can be seen across the length and breadth of the sixteen regions in Ghana. Metalwork such as making of farm implements, cooking utensils, body decorative items, office related items, home decorative pieces, weapons and many others are more pronounced in some specific regions. These tell that each region may have some specific Metalwork that is associated with it and related metal or minerals used in producing these works.

Significant enough, no holistic records or document has been put together practically to educate the general public about the history that is associated with all the sixteen regions as regards to the types of metalwork and its related metal in that region. It is for this reason that the researchers endeavored to study this phenomenon and produce an artwork depicting the type of jewellery and metalworks that each region is noted for using the map of Ghana as its substrate

metal and employing techniques such as repousse and chasing to fabricate the finished work. The researchers intend that the study will serve as an educational material for the jewellery and metalwork industry. In order to achieve the objectives of the study, the researchers set out to:

1. Trace the history of jewellery and metalworks of each of the sixteen regions in Ghana to ascertain the types of indigenous jewellery and metalwork produced.
2. Identify types of jewellery and metalwork associated with the sixteen regions in Ghana.
3. Use repousse and chasing techniques to depict the identified types of indigenous jewellery and metalwork that are associated with each region on the Ghana map to serve as an educational material for the jewellery and metalwork industry and the general public.

The history of metalworking can be traced back to 6000 BC with the use of copper, gold, silver, lead, tin, and iron in producing needed items by the community. It was not until the 19th century that other metals including aluminum were discovered and technologically fabricated into a finished product. By that time, mankind discovered over eighty metals for use. It must be noted that mainly Mesopotamians, Egyptians, Greeks, the Roman, Chinese, Hittites, and Indians pioneered civilization of metalworking and its spread among others (makin-metals.com/about/history-of-metals-infographic). Metals such as gold, silver, iron and aluminum can largely be traced in the his-tory of Ghana metal works (Ayensu, 1997).
The history of indigenous metalworks in Ghana can be traced from the Gold Coast regime dating from the 12th century. The Europeans that brought the knowledge of metalwork technology included Portugal, Netherland, Sweden, Denmark and Great Britain. Those who stayed long in the then Gold Coast and now Ghana were the Portuguese and the British. These two countries played a major role in metalwork technology in the coastal belt of Ghana. Indirectly the Germans influenced the metalwork technology in the eastern corridor side of Ghana since they were controlling our neighbouring country, Togo. The country was composed of the Northern Territories, Trans Volta Togoland, Ashanti and Gold Coast Colony as shown in Figure 1. The current map of Ghana is seen in Figure 2.

Figure 1 Map of Gold Coast

Figure 2 Map of Ghana

Northern Territories known as the region of Dagombas were established with the Dagombas. History has it that the earliest kingdom to emerge in present-day Ghana was the Dagbon kingdom which is made up of the Dagombas, Mamprusi, Gonja, Mossi and Kassena among others. The kingdom was established in the early 11th century. The Mandes who were then settled in Mali, Niger through Burkina Faso, introduced Northern Territories to metalwork. They first introduced the technology to the Dagombas (Labi, & Ansah, 2008).

The Dagbon people traded in weapons because they were battling territories. For territorial supremacy, the Bono state and the Ashanti's had a lot of engagement with the Northern territories. The engagement was on both battle and trade. Northern territories were also hunters and farm root crops. The present state of the Northern territories is now Upper West, Upper East, Savannah, North East and Northern regions.

Trans Volta Togoland was officially the Mandate Territory of Togoland and later became the Trust Territory of Togoland, which was a territory in West Africa, under the administration of the United Kingdom. The Trust Territory of Togoland subsequently entered into a union with Ghana of which part became Volta Region. It was effectively formed in 1916 by the splitting of the German protectorate of Togoland into two territories of French Togoland and British

Togoland, during the First World War. Initially, it was a League of Nations Class B mandate. In 1922, British Togoland was formally placed under British rule while French Togoland, now Togo, was placed under French rule (en.wikipedia.org/wiki/British_Togoland).

The Germans introduced trans Volta Togoland to metalwork such as jewellery and other artefact making. The Germans handed over decoration, jewellery, and forging techniques to them. The Germans transferred the knowledge of designing decorative items, jewellery, product-ion of farming implements and fishing items to the Trans Volta Togoland. The present portion of Trans Volta Togoland in Ghana is now Volta and Oti region (Labi, & Ansah, 2008).

Bono, Bono East and Ahafo are trading regions created by the Bono people, located in what is now the middle belt of Ghana. The enclave was founded in the eleventh century. This became possible because of the search for gold in the area. The Bono state is noted for its gold re-sources. The people settled there to trade in gold. The gold trade started at Boom in Bonoman as early as the 12th century ((Ukpabi, 1970). The Bono, Bono East and Ahafo region traded in artworks including umbrellas used for the Kings, swords as a symbol of authority, the stools, and woven kente cloth. They also practiced goldsmithing, blacksmithing and gold weighing. The Ivoirians and the northern territories influenced their metalwork technology.

By the 17th century, the confederacy of A-shanti states was transformed into an empire with its capital at Kumasi. The Ashantis fought the northern territories to subject some of them to exchange of professions and trading such as the skill of blacksmithing and royal regalia artworks. The Ashantis were introduced to metalwork by mainly the Dagbon kingdom and the Bono State (Bono, Bono East and Ahafo region) particularly apprentices from the Northern territories and also to a minute extent the Portuguese and the British from the coast (Labi, & Ansah, 2008). They also had an exchange with the Fantes, which led to acquiring tooling and body adornment fabrication methods. Their productions were precious metals (gold) made with sections of them in brass, copper and aluminum. A notable gold element among the Ashantis is the golden stool (Uk-pabi, 1970).

The Ashantis had a combination of casting, forging, jewellery and working tool technology since they found between the coast colony and the northern territory. The Ashantis practiced traditional casting to produce royal regalia, farming implements and weapons. The dominated metal used was the non-ferrous metal that is gold, silver and aluminum (Ukpabi, 1970).

The Gold Coast colony of present Ghana had a lot of encounters with countries such as Portugal, the Netherland, Sweden, Denmark and Great Britain due to the infiltration of these expatriates along the coastal belt. The occupants could not form a strong alliance to control the coastal belt. Although the Fante Confederation stood tall, they could not control it all along the coast. The Ga Adangme and Ewe States among others also emerged to open up the system making it uncontrollable among the indigenes along the coast (Essien, 2016).

Gold Coast Colony was introduced to metalwork technology particularly jewellery and artefact design by the Portuguese and the British. The Portuguese and the British introduced the Gold Coast Colony along the coastal belt to decorative and tooling items. These included Jewellery, working tools in the area of fishing, farming, transporting and infrastructure. The dominated metal used was the nonferrous metal that is; gold and aluminum. The Gold Coast Colony is now Central, Western, Western North, Greater Accra and part of the Eastern region. They were into fishing, farming, goldsmith and hunting.

In the spectrum of the introduction of metalwork technology in Ghana, four major types of metal fabrication technology played a major role. These were casting, forging, goldsmithing and blacksmithing. The Mandes taught the Northern Territories casting and forging techniques in producing farming implement, utensils and hunting weapons. It must be noted that ferrous metal was used in their production. The Bono State learnt metalsmithing to produce regalia, decorative items and farm implements. They also practiced goldsmithing, blacksmithing and gold weighing. The Ivorians and the northern territories influenced their metalwork technology.

The Germans taught Trans Volta Togoland indigenes decorative, jewellery, and forging technology. The Ashantis metalwork technology is anchored on casting, forging, jewellery and working tooling technology. Gold Coast Colony metalworks technology is oriented toward jewellery, artefact design and working tools production. The types of metalwork produced

were influenced by the occupation of the people and the exigency in that community. The coastal belt indulged in office work, chieftaincy, cocoa farming, and fishing. The middle belt was engulfed in chieftaincy, weapons, mining, cocoa farming, plantation and the northern belt was into hunting, weapons, farming, and quarry.

Metalworking techniques are the means and ways of transforming metal into a functional or purposeful item. According to www.britannica .com/topic/metalwork, the familiar metalworking techniques of this current dispensation include repousse, embossing, chasing, inlaying, gilding, wiredrawing, casting, forging, soldering and the application of niello, enamel, and gems. For the purpose of this study chasing and repousse techniques were used as the focal point of exploration.

A substrate surface design that renders the surface in relief form is known as chasing. In this technique the design is projected on the surface of the metal. In the process of chasing a metal, the metal is fabricated from the front by hammering punches in line with the required design (Brepohl, 2020). This implies the use of tools that will raise, depress, or push aside the metal without removing any from the surface. Chasing is a technique used to refine raised portions from the front. But Corwin (2010) deals with what happens in front of the metal after the design has been beaten from behind to describe chasing. It is argued that chasing refers to groove, furrow, channel, or indentation. This technique uses the malleability of the metal to form shapes and in the course of it no material is lost or wasted (Meis & Kashima, 2017). Chasing has a strong relation with repousse when it comes to metal surface design. The two techniques are often used simultaneously.

Repoussé is a metalworking technique in which a malleable metal is shaped by hammering from the reverse side to create a design in low relief. Repousse is used to work on the reverse of the metal sheet to form a raised design on the front of the work. It is a decorative method that mostly goes in hand with chasing (britannica.com/ topic/metalwork).

A good chasing and repousse work exhibits properly defined edges, well-accentuated forms and properly demarcated relief images. Works of this nature crave much attention because of their unique aesthetic qualities. Looking at the potential of chasing and repousse techniques, the study intends to use these media to depict identifiable metalworks related to each region in Ghana which will educate the general public on the known and un-known of the metal design industry.

Metal sheets that are suitable for chasing and repousse are mainly nonferrous metals. These metals must be malleable to enable relief forming. Examples of such metals are copper, brass, aluminum, silver, and gold. Other metal includes bronze (nancylthamilton.com/techniques/basic-chasing-and repousse/#Metals_for_Chasing_and_Respouse) as shown in Figure 3. The study used aluminum to produce the final work.

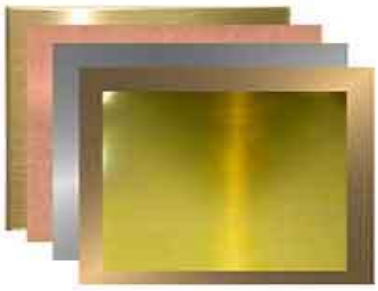


Figure 3 Metal sheet (copper, brass, aluminum, silver, and gold)

A pitch is required before a metal can get a good chase and repousse state, in terms of depth and perspective (Untracht, 2011). A pitch may be made of a mixture of things including pine resin or asphaltum, waxes and fillers like fine clay and sand but at all cost, a repousse or chasing tools must be available to complete the needed tools to work with (Safety Works Maine, 2014). Metal to be chased or repousse must be annealed to make it work-able after cooling down. It is then pickled or washed with sulphuric acid and rinsed with water afterward. Its surface is dried with clean cloth and placed on the pitch. The pitch is then placed on a sandbag to prevent it from tipping off. During chasing one must hold the tool for chasing and repousse in a right angle towards the surface of the sheet with the left hand and with the hammer in the other hand, tap the end of the punching tool. The tip must be focused on the lines of the designs and run through with continuous taps until the design pops up and then repousse is started from the reverse of the sheet. Dipping it in a solution of Sulphur and then rubbing the high spot with the palm of the hand and steel wool can shade a chased and repousse work. This process called oxidation gives depth and perspective clearly and detailed obviously from a distance.
Since the focus of the study is to trace the history of Ghana's metalworks and the findings were to

identify indigenous metalworks through which its technology gave birth to modern metalworks in the regions of Ghana. The outcome can artistically and visually educate well when the identified indigenous metalworks are chased and repousse on a Ghana map contextually. The Ghana map is symbolic and a good heritage for the Ghanaian people. Its sight by any patriotic Ghanaian attracts attention and respect of fulfillment. The study factored in analysis of the impact of the map of Ghana aligning with the objective of the research (ghanamissionun.org/map-regions-in-ghana/).

The study has the potential of serving tourists need. It traces the history and identifies indigenous metalwork throughout the sixteen regions but projects the most fabricated and used ones. The study is to give a one stop tour of types of indigenous metalworks identifiable with each region (en.wikipedia.org › wiki/Tourism).

In Ghana, one of the mother agencies in charge of the preservation and promotion of arts, culture and tourism is the Ministry of Tourism, Arts and Culture. The aim of this ministry is to diversify and expand the tourism industry for economic development, develop a competitive creative arts industry, promote culture throughout the development process, enhance Ghana's international image and influence, promote Ghana's political and economic interests abroad and integrate the Ghanaian diaspora in national development process. The study is to aid this vision and by so doing promote the outcome of the research (motac.gov.gh/index.php and en.wikipedia.org/wiki/Ghana_Tourism_Authority).

2.0 Materials and Methods

This study is to create empirical chasing and repousse visual artwork that traces the identity of metalworks related to regions and bringing to bear the appreciation of aesthetic qualities that accompanies creative work of visual art. The study adopted partly descriptive survey and mainly studio based research approaches. The former was to generate data and the latter to practically interpret data in creative art (Puadi, Khairani & Othman, 2020). Embedded in these approaches were the descriptive data generation process and studio artwork production with the aim of increasing knowledge of art, science and technology of indigenous metalworks that gave birth to modern metalworks in Ghana (Given, 2008).

Through survey study, empirical data were collected among jewellery and metalwork producer and their works in the regional capitals between November 2020 and December 2021. The target population for the study was jewellery and metalwork producer and their works as well as consumers of jewellery and metalwork in Ghana.

The study purposively sampled five (5) workshops each in the sixteen (16) regions of Ghana making a total of 80 metalworks workshops of which 4 respondents each were used for analysis (320). The regional capitals were the focus. A total of twelve (12) individuals of which two each were from Centre for National Culture in Accra, Kumasi and Wa as well as Ghana Tourist Authority in Accra, Kumasi and Wa respectively were also part of the sample for the study. Interviews, observations and photographs were used to collect the data for the study.

2.1 Tracing the history of indigenous metalworks in Ghana

During the interview and observation, twenty (20) respondents that the researchers spoke to indicated that the people of Bono Region are mostly farmers and traders. Due to the profession of the people in the region, they produce more farm implements than any other metal products. They produce pinch point pry bars, cutlass, digging pry bars, metal traps and coo-king pots among others.

In Ahafo Region formally Brong Ahafo region, the researchers realised that all twenty (20) respondents gave similar responses. The metal design fabricators in this region mainly produce hoe, pinch point pry bar, earth chisel, and body decorative pieces (royal regalia, anklets, crown, strap amulets). According to them, farming tools are found in almost every house, in addition, jewellery items are next to being seen in their homes. The people are predominately farmers as such the production of farm implements.

The researchers engaged 20 respondents from the Northern region who asserted to producing many metalworks using both local and foreign methods. These include butcher's knife, donkey trucks, sickle metal, hoe, mattock, guns, anklets and amulets, particularly for festival celebrations. According to Garrard (1980) history of metal design and fabrication in the northern part of Ghana originated from the Northern region

courtesy the Mandes from Mali and Niger. Northern region started casting and blacksmithing technology which spread across Ghana (Labi, & Ansah, 2008). Their metalworks were influenced by hunting, farming and festival.

The study in Western region unveiled that one can identify the region with earth chisel, bakery pan, regalia, linguist staff, pinch point pry bar, farm implement and jewellery. The indigenes are mostly into farming and mining. The area is hilly, mountainous and full of heavy rain. Due to their activity, they produce more farm and digging tools as aforementioned.

Analysis of responses in the Bono East region pointed to the fact that farm implements are mostly produced by the metal design and fabricators due to the economic activities of the people in the region. The region is specialized in the production of hoes, cutlasses, pinch point pry bars, earth chisels and guns. They also produce jewellery but not as much as the farming implement.

The North East region is one of the newly created regions carved out from the Northern Region. The North East region is also a farming community in Ghana. Majority of them farm different kinds of product such as rice, millet, soya beans, maize, and yam among others. The study discovered that types of metalwork that the metal design and fabricators produce are improvised cow plough pull, butchers' knife, hoes, sickles and related utensils.

Eastern region has at their disposal available natural mineral resources. The study indicated that the region is known for gold, timber, diamond, but the gold and diamond are located at the western side of the region. As a result gold jewellery is commonly found among the people who are located in the precious mineral enclave. The royals mostly use the gold jewellery. The region is also known for glass and clay beads which are well produced by the Krobos who are located at the eastern side of the region. Certainly, the region is known for both precious and costume jewellery. The metal design and fabricators are into royal regalia and utensil production.

In Savannah Region, the researchers discovered that the people especially those in Damango are predominately farmers and hunters. Due to their activities, they have blacksmiths who produce basic tools for their needs such as hoes, cutlasses, metal cooking pots, and arrowheads. Savanna Region is a new region carved out from the Northern Region of Ghana in 2018.

Central Region as the study shows is known for fishing along the coastal areas. Regardless of the fishing, and other businesses, the metal design and fabricators in the Central region produce jewellery and metalworks that are used to decorate their bodies and also farm and fishing implements to help them in their farming activities. The results of the study unveil the metalworks produced that can be used to represent the Central region including chieftaincy regalia, cutlass for farming, fish hook and digging pry bar. They have jewellers and blacksmiths who are in charge of these productions.

The Greater Accra region is the capital town of Ghana and the most populated region according to the 2021 census. The people of the Greater Accra region are predominantly fishermen, farmers and fishmongers. There are goldsmiths and blacksmiths who produce items such as beads, gold and silver decorative pieces in the region. Although they produce the above, fundamentally the indigenes are recognized in the production of cooking utensils like metal pots, aluminum cooking pots, ladles and bowls.

The Volta region stands out with its unique items such as hunting tools, farming tools, carpentry tools, chieftaincy regalia, and cooking utensils according to the study. Despite the fishing activities of the Voltarians, they farm as well. The research analysis of the region indicated that the metalworks that represent the Volta Region are carpentry tools like chisel hammer and saw. The metal designers and fabricators also produce guns for hunting, axe and digging pry bar for farming. They produce chieftaincy regalia but on a small scale as compared to others.

The Upper West region is noted for producing farming, utensil and hunting metalworks. According to Tetteh, Adu-Agyem and Arthur (2018), in the Upper West region, almost all kinds of metalwork are used, of which few are produced by the metal designers and fabricators. The study highlighted metalworks produced in the region mainly as farming implements, cooking utensils, and products like metal gates, bows and arrows for hunting and defense.

In the Upper East Region, the metalworks that are produced include utensils, farming and those used for hunting. The study reveals that the metal designers and fabricators are familiar with the

production of cattle plough pull, hoes, arrowheads, cauldron (metal cooking pots) and partly decorative pieces. All responses affirm the above mentioned metalworks and associate them with the kind of work that is prevalent in the region.

The Ashanti region is one of the richest and second most populated regions in Ghana. The Ashantis are known for their rich cultural heritage for ages. They produce jewellery, body adornment and chieftaincy regalia to honour their kings, chiefs and queen mothers. The Ashanti region has precious minerals like gold, timber and many other natural resources. The people of Ashanti region are naturally craftsmen and traders. They mine gold in large quantities in Obuasi. The Ashanti region is known for chieftaincy regalia, linguist staff, jewellery for body adornment and packaging trunks as metalworks mainly produced by metal designers and fabricators in the region.

Oti region is a new region created out of the Volta region in 2018. The study unfolded that the Oti region is well appreciated for farming tools, carpentry tools, and fishing tools. The metal design and fabricators are majored in producing hoe, claw bar, saw and fishhooks. On a minor scale, they produce arrows and utensils for the people in the region. The productions are mostly ferrous metal made.

The Western North region shares boundaries with Brong Ahafo, Ahafo, Ashanti, Central and Western regions as well as Ivory Cote. It was created out of the Western region in 2018. The people of Western North region are farmers and hunters. The metal designers and fabricators produce metalworks such as cutlass, digging pry bar, arrows, pinch point pry bar and royal regalia for chiefs. The region is also endowed with gold and bauxite.

Table 2.1 Response from metal designers and fabricators in Ghana

S/N	Region	Frequency	Percent	Farming/ Fishing Implements	Utensil	Jewellery	Weapons/ Hunting	Carpentry Tool	Others
1	Bono	20	6.25	10/20	7/20	0/20	3/20	0/20	0/20
2	Ahafo	20	6.25	14/20	0/20	1/20	5/20	0/20	0/20
3	Northern	20	6.25	9/20	3/20	0/20	8/20	0/20	0/20
4	Western	20	6.25	5/20	6/20	9/20	0/20	0/20	0/20
5	Bono East	20	6.25	12/20	0/20	2/20	6/20	0/20	0/20
6	Northeast	20	6.25	16/20	4/20	0/20	0/20	0/20	0/20
7	Eastern	20	6.25	0/20	8/20	12/20	0/20	0/20	0/20
8	Savannah	20	6.25	8/20	6/20	0/20	6/20	0/20	0/20
9	Central	20	6.25	10/20	2/20	8/20	0/20	0/20	0/20
10	Greater Accra	20	6.25	1/20	11/20	7/20	1/20	0/20	0/20
11	Volta	20	6.25	6/20	1/20	1/20	4/20	8/20	0/20
12	Upper West	20	6.25	8/20	6/20	0/20	4/20	0/20	2/20
13	Upper East	20	6.25	7/20	6/20	1/20	6/20	0/20	0/20
14	Ashanti	20	6.25	3/20	3/20	12/20	0/20	0/20	2/20
15	Oti	20	6.25	10/20	1/20	0/20	1/20	7/20	1/20
16	Western North	20	6.25	13/20	1/20	0/20	4/20	0/20	2/20
		320	**100**	**132/320 (41.25%)**	**65/320 (20.3%)**	**53/320 (16.56%)**	**48/320 (15%)**	**15/320 (4.7%)**	**7/320 (2.19%)**

Source: Field Work, 2021

2.2 Procedures used in interpreting the data into repousse and chasing artwork

This section highlights the steps applied to complete the production of the educational piece that tells the fundamental history of jewellery and metalworks identified with each region in Ghana. The production process or techniques employed by the researchers included, concept development, sketches, Computer Aided Design (CAD), fabrication processes and appreciation of the resulting art pieces.

2.3 Idea Development

The ideas were taken from various types of jewellery and metalwork produced and available in the northern, middle and southern belt of Ghana, from which inspirations were taken broadening the researchers' understanding and corroborating the data collected to give specific analysis and correct representation of the fabricated work.

2.4 Design Concept of Jewellery and metalworks representation of each region in Ghana

The researchers delved into different identify-able metalworks of each region per the data collected and rendered them into drawings. The drawings as shown in Figures 4 to 19 are different types of drawings of indigenous metalworks of the various regions as analysed to serve as a representation of each region on the educational piece by the researchers before coming out with the final chased and repousse fabricated work. Figure 20 shows the distribution of the indigenous jewellery and metalworks on the map of Ghana on which civilization of jewellery and metalworks started in Ghana.

Figure 4 Metalworks produced by the people of Central region

Figure 5 Metalworks produced by the people of Ahafo region

Figure 6 Metalworks produced by the people of Eastern region

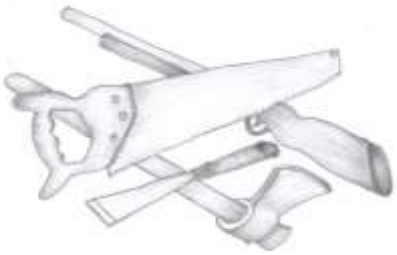


Figure 7 Metalworks produced by the people of Volta region

Figure 8 Metalworks produced by the people of Northern region

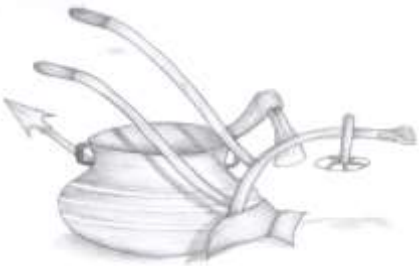


Figure 9 Metalworks produced by the people of Upper East region

Figure 10 Metalworks produced by the people of Western region

Figure 11 Metalworks produced by the people of North East region

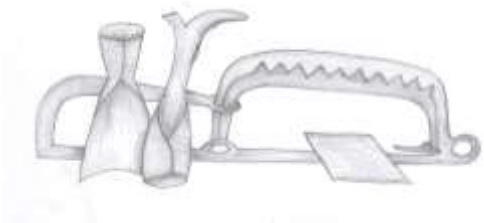


Figure 12 Metalworks produced by the people of Bono Ahafo region

Figure 13 Metalworks produced by the people of Upper West region

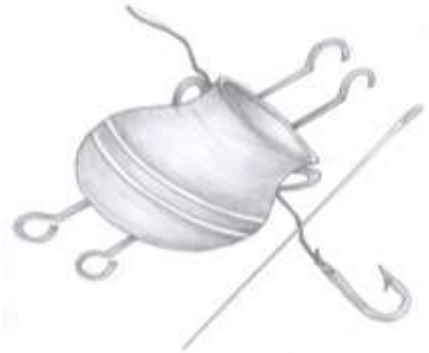


Figure 14 Metalworks produced by the people of Greater Accra region

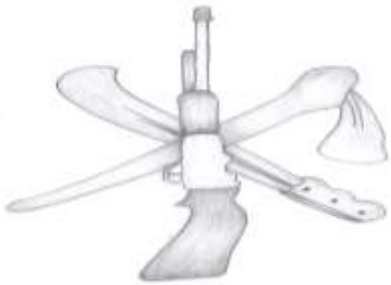


Figure 15 Metalworks produced by the people of Bono East region

Figure 16 Metalworks produced by the people of Ashanti region

Figure 17: Metalworks produced by the people of Savannah region

Figure 18 Metalworks produced by the people of Oti region

Figure 19 Metalworks produced by the people of Western North

Figure 20 A drawing of how indigenous jewellery and metalworks are located in Ghana

2.5 Computer Rendering of Design Concept

The study used Corel Draw x 20 to render the drawings into well defined shapes that can be clearly accentuated on the aluminum sheet and the map of Ghana (See Figures 21 to 37). This was done according to the regions in Ghana.

Figure 21 Upper East Region

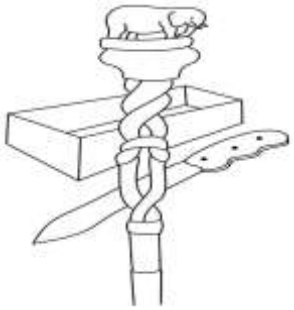


Figure 22 Western Region

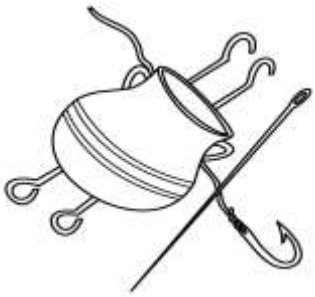


Figure 23 Greater Accra Region

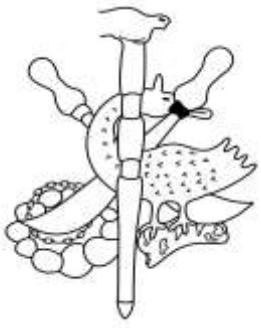


Figure 24 Ashanti Region

Figure 25 Volta Region

Figure 26 North East Region

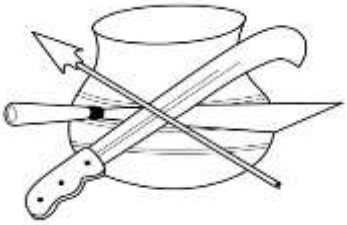


Figure 27 Savannah Region

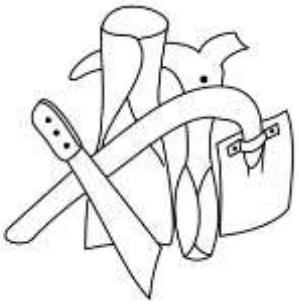


Figure 28 Ahafo Region

Figure 29 Upper West Region

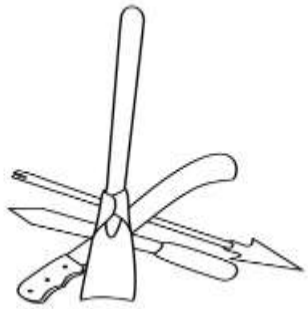


Figure 30 Western North Region

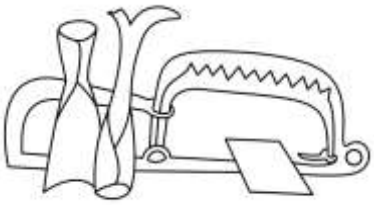


Figure 31 Bono Ahafo Region

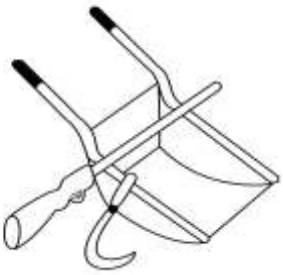


Figure 32 Northern Region

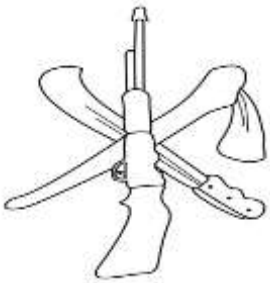


Figure 33 Bono East Region

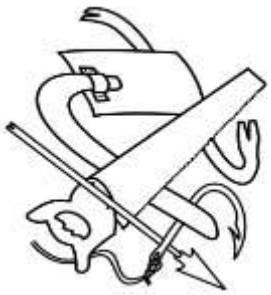


Figure 34 Oti Region

Figure 35 Central Region

Figure 36 Eastern Region

Figure 37 Final Computer rendering of Design on Ghana Map

2.6 Tools, equipment and materials used for the production

Tools, equipment and materials are essential components in every production process. Without these tools, equipment and materials, decorative metalworks such as jewellery, utensil, desk nameplate among others cannot be produced, therefore the researchers used the following tools, equipment and materials in the production process **(**Nonresident Training Programme, 1992**)**. These included measuring tape which was used for measuring, punches for designing, cutting shears was used to cut out portions not needed after the required size. Jewellery saw frame was used for piercing. Hammer and mallet were used to beat

the metal plate on an anvil. Files were used to file the sharp edges of the work. Pliers were used to hold the chasing tool in place so that the mallet will not hit the researcher's hand. Chisel assisted in cutting shapes out. Cotton was used for cleaning. Torch was used for annealing and scorching wood substrate.

Equipment used by the researchers to execute the work were milling machine which was used to mill metal to required sizes when necessary, bench vice for holding, and drilling machine for creating holes. Anvil was used for shaping material such as aluminum plate was used as a substrate for chasing and repousse. 1inch plywood was used as a backdrop, and sand paper was used to smoothen the surface of wood and aluminum. Emery paper was used to smoothen the surface of aluminum

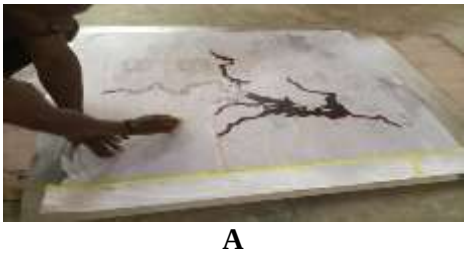
and PVA white glue was used to paste paper with drawings on aluminum sheet (Gnanaharan & Mosteiro, 1997).

2.7 Fabrication of Regional identifiable Jewellery and Metalwork on the Ghana map as an Educational Piece

This section sort to deal with putting together traced history of indigenous jewellery and metalworks across Ghana on one substrate to serve as an educational material for metal and jewellery industry. The procedures involved in the production are elaborated in Figures 38 to 82.

2.8 Transferring of Design onto Substrate

The composed design of the various regions was printed on paper which was then pasted onto the aluminum plate for transferring of the design onto the substrate, as shown in Figure 38.



A

B

Figure 38 Pasting of design on metal (A-B)

A

B

Figure 39 Applying pressure on pasted design to hold firmly (A-B)

A

B

Figure 40 Researchers making correction on design before repousse (A-B)

A

B

Figure 41 Wood used for pitch in chasing and repousse (A-B)

2.9 Chasing and Repousse of identified jewellery and metalworks of each region

The researchers explored punches and other improvised tools to bring out the identified jewellery and metalwork symbols of each of the sixteen regions on aluminum substrate. Improvised pitch, chasing and repousse punches together with hammer were employed to cre-ate relief designs of identified metalworks on the aluminum plate as seen in Figure 42.

A

B

C

D

Figure 42 Chasing and Repousse techniques being created on aluminum sheet (A-D)

2.10 The outcome of chased and repousse metalworks of the sixteen regions

A distinguished chased and repousse indigenous metalworks identifiable with each of the regions as represented on the finished work are seen in Figures 43 to 58.

Figure 43 Western Region

Figure 44 North East Region

Figure 45 Volta Region

Figure 46 Ashanti Region

Figure 47 Western North Region

Figure 48 Ahafo Region

Figure 49 Bono Ahafo Region

Figure 50 Northern Region

Figure 51 Upper West Region

Figure 52 Eastern Region

Figure 53 Oti Region

Figure 54 Upper East Region

Figure 55 Bono East Region

Figure 56 Greater Accra Region

Figure 57 Central Region

Figure 58 Savannah Region

2.11 Cutting out of chased and repousse decorative work

After being beaten into relief design the identified indigenous jewellery and metalwork symbols onto the aluminum substrate, the negative areas were then cut out for clarity and visibility of the chased and repousse work on the map of Ghana. See Figures 59 to 60. In this process, the researchers used chisel, punches, mallet and jeweller's saw to separate (cut out) the positive from the negative area. The cutout positive part of the work is shown in
Figure 61.

A

B

C

Figure 59 Accentuating edges of chased and repousse work to cut it (A-C)

A

B

C

Figure 60 Cutting edges to let out map (A-C)

Figure 61 Finished cutout chased and repousse work

2.12 Cutting out of wood support for chased and repousse work

In order to firmly hold the finished work and to allow for easy movement without touching the metalwork, the researchers created a wood (42'' x 35'') substrate slightly beyond the dimension of the metalwork (40'' x 33.5''). Cutting of the wood substrate is detailed in Figures 62-64. The finished cut out wood and how it was aligned

with the metalwork is exhibited in Figures 65 and 66 respectively.

A

B

C

Figure 62 Marking out the length of the wood substrate for cutting (A-C)

A

B

C

D

Figure 63 Cutting of edges of wood (A-D)

Figure 64 Cutting of edges of wood

Figure 65 Finished cut out wood

A

B

C

Figure 66 Aligning cutout of metalwork and wood substrate for assessment (A-C)

2.13 Finishing of cutout aluminum plate

The edges and the surface of the aluminum cutout work (chased and repousse work) were corrected by the use of files, sand and emery papers. This was to ensure that the edges are smooth so it does not hurt and the surface well polished to do away with dents and lines. See Figures 67 and 68.

A

B

C

D

E

Figure 67 Filing the edges of the cutout aluminum plate (A-E)

A

B

C

Figure 68 Sanding and cleaning of cutout aluminum plate (A-C)

2.14 Finishing of wood substrate

The scorching process was carried out on the surface of the wood substrate to give it a dark shade that will bring the metal plate work out when fixed as shown in Figure 69. It was then lacquered to give it a glossy finish.

A

B

C

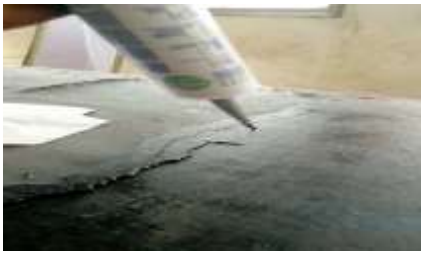
Figure 69 The wood substrate being scorched to give it a dark shade (A-C)

2.15 Fixing of chased and repousse work on wood substrate

The researchers first and foremost checked for realignment of the metalwork on the scorched wood and then demarcated areas where the metalwork will cover leaving scorched wood space around it as seen in Figure 70. The fixing was done using adhesive paste along the edges of where the metalwork will cover. Weight was placed on the work to get it well fixed. The edges of the metalwork were firmly secured on the scorched wood using nails. Figures 71 to 73 give a clear picture of how the processes were done.

Figure 70 Researchers demarcating area to fix the metalwork to create balance on the scorched wood

A



B

C

Figure 71 Adhesive being applied to the scorched wood to fix chased and repousse worked (A-C)

A

B

C

Figure 72 Chased and repousse work being fix onto scorched wood using hand and weight (A-C)

A

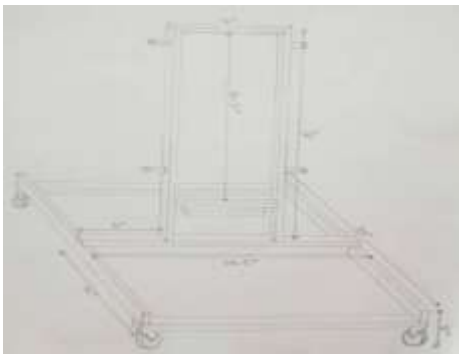
B

C

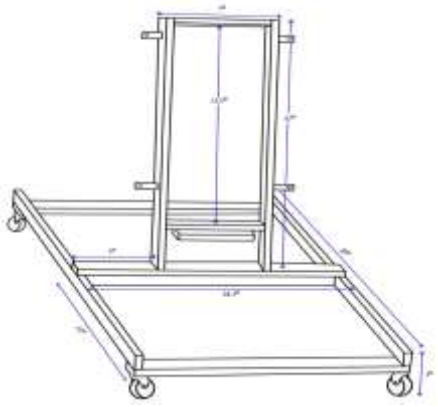
Figure 73 Securing the edges of the metalwork on the scorched wood with nails (A-C)

2.16 Pedestal fabrication for finished chased and repousse work

The finished work is to rest on a stand for visibility and easy movement. The researchers designed the concept of the stand with its dimension (47''x 30''x 18.5'') as referenced in Figure 74. The processes have to do with measuring, cutting, welding and finishing to arrive at the completed stand. See Figures 75 to 78.



A



B

Figure 74 Dimension of the stand (A-B)

A

B

C

Figure 75 Measuring and cutting of square pipe (A-C)

A

B

C

D

E

Figure 76 Welding of square pipe for stand of chased and repousse work (A-E)

A

B

C

Figure 77 Filing and fillering of the welded stand (A-C)

A

B

C

Figure 78 Finished stand for chased and repousse work (A-C)

2.17 Polishing of fixed chased and repousse work on scorched wood substrate

The fixed work was finished appropriately with the use of emery cloth, oil, tripoli, rouge and cotton. The emery cloth with oil was used first, and then Tripoli was applied to the surface of the work. Rouge was finally applied and cotton wool was used to clean the finished work. See Figure 79.

A

B

C

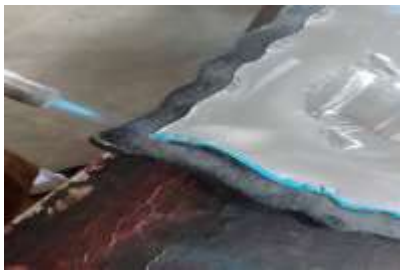
D

Figure 79 Finishing work using emery cloth with oil, tripoli, rouge and cotton (A-D)

2.18 Enamel application to the chased and repousse work

In order to make visible the river Volta on the map of Ghana, the researchers applied enamel substance to where the river is located. This was also to add aesthetic value to the finished work and make it more appealing to anyone who comes in contact with the work. See Figure 80.

A



B

C

Figure 80 Enamel being applied to the chased and repousse work (A-C)

2.19 Finished work

The repousse and chased work fixed on scorched wood substrate which is placed on a stand for educational purposes is seen in Figures 81 and 82. Figure 81 shows the work yet to be enameled and Figure 82 shows the final work enameled.

A

B

Figure 81 Work yet to be mounted on a pedestal (A-B)

Figure 82 Finished work on a pedestal

3.0 Results and Discussion of Findings

In the process of the study, there were discoveries and findings that came to light. The findings to be discussed were based on the laydown objectives of the study.

3.1 Objective one of the study was to trace the history of jewellery and metalworks of each of the sixteen regions in Ghana to ascertain the types of indigenous jewellery and metalwork produced.

The study traced the history of indigenous metalworks and the technology handed over to the metal designers and fabricators from the colonial age. It was discovered that the then Gold Coast was divided into four, 1) Northern Territories; Upper West, Upper East, Savannah, North East and Northern region, 2) Ashanti; Bono, Bono East, Ahafo region and Ashanti, 3) Trans Volta Togoland; Volta and Oti region and 4) Gold Coast Colony; Central, Western, Wes-tern North, Eastern and Greater Accra Region.

Records of metalworks and their technology were given formal account during the period of the 12th century in Ghana. The northern territories were introduced to metalwork technology by Francophone countries in West Africa specifically the Mandes. The Ashantis made up of the Bono State and the real Ashantis got their lessons partly from the northern territories and Ivory Coast. The Trans-Volta Togoland metalwork history emanated from the Germans and the French. The Gold Coast Colony has a lot of European influence. Portugal, Netherland, Sweden, Denmark and Great Britain were the countries that formed the basis for metalwork history along the coast.

3.2 Objective two was to identify types of jewellery and metalwork associated with the sixteen regions in Ghana.

The study discovered two categories of identified metalworks: the one under the Gold Coast regime and that of current Ghana

3.2.1 Types of metalworks identified to be produced in the regions under the colonial rule

- The study ascertained the northern territories of Ghana to have traded in weapons (arrows, guns, metal traps), which they produced because they were battling territories. They were hunters and they farm root and cereal crops using their own manufactured tools. The present state of the Northern territories is now Upper West, Upper East, Savannah, North East and Northern region.
- The Trans-Volta Togoland now Volta and Oti region in present day Ghana made a case of designing decorative items, jewellery, production of farming implements, fishing items and forging technology acquired from the Germans.
- It was noted that the Bono, Bono East and Ahafo region, which form part of the middle belt, had a significant history of metalworks. They traded in artworks including finial for umbrellas used for the kings, swords as a symbol of authority, the stools, and Kente Cloth weaving. They also practiced goldsmithing, blacksmithing and gold weighing. The Ivorians and the northern territories influenced their metalwork technology. The Ashan-tis who also find themselves in the middle belt practiced traditional casting to produce royal regalia, farming implement, weapons, tooling and body adornment. The dominant metal used by the Ashantis are the non-ferrous metal, that is gold, silver and aluminum (Ukpabi, 1970).
- The Gold Coast Colony along the coastal belt is known to produce decorative and working tools that is jewellery, fishing, farming, transporting and infrastructure tools. They are familiar with non-ferrous metal including gold and aluminum. The Gold Coast Colony is currently the now Central, Western, Western North, Greater Accra and part of Eastern region. They were into fishing, farming, goldsmith and hunting.

3.2.2 Types of metalworks identified to be produced in the regions of Ghana

The study identified 30.25% of the regions understudy to have little or no information on how and where the jewellery and metalworks originated. The data shows that these regions include North East, Savannah, Oti, Bono Ahafo and Western North because they are newly created regions and are yet to establish their history but currently, draw their records from other regions as pertaining to colonial history. The existing ones are scanty and are based on individual efforts either through research papers or documentaries on segments of metalwork. The researchers believe that the struggle to trace history of these regions gives a lot of leverage to this type of study to be encouraged in diverse ways to bring to light more of the history and identity of jewellery and metal-works associated with each region in Ghana.

- Bono Region are into the manufacturing of farm-oriented and utility needs which include pinch point pry bars, cutlasses, earth chisel, metal traps and cauldron.
- Metal design and fabricators in the Ahafo region are into the production of farming tools and segment of jewellery. They produce hoes, pinch point pry bars, earth chisels, and body decorative pieces (royal regalia, anklets, crown, strap amulets).
- The study established that the people of the Northern region are known mainly for butchers' knives, donkey trucks, sickle knives, hoes, mattocks, guns, anklets and amulets particularly for festival celebration as the jewellery and metalworks produced by the metal design and fabricators in the region.
- Research in the Western region unveiled that one can identify the region with earth chisel, bakery pan, regalia, linguist staff, pinch point pry bar, farm implement and jewellery.
- It was discovered that Bono East region is specialized mainly in the production of hoes, cutlasses, pinch point pry bars, digging pry bars, earth chisel and guns. They also produce jewellery but not as much as the farming implement.
- During the study it was discovered that the North East region, which was carved out of the Northern Region, produces metalwork as such improves cow plough pull, butchers' knives, hoes, sickles and related utensils.
- Concerning the metalworks being produced in the Eastern region, it was realized that they produce jewellery, glass and clay beads, royal regalia, utensil and farm implements. The region is known for both precious and costume jewellery.
- As a new region the study shows that the metal design and fabricators in Savanna Region are

blacksmiths who produce basic tools for their needs such as hoes, cutlasses, metal cooking pots, and arrowheads for hunting and farming.

- The results of the study unveiled the metalworks produced that can be used to represent Central region should be chieftaincy regalia, body decorated items, cutlass for farming, fish hook and digging pry bar.
- The fundamental metalworks that the indigenes in Greater Accra are recognized with are the production of cooking utensils like metal pots, ladles and bowls. They produce jewellery such as clay beads, glass beads, gold and silver decorative pieces.
- The research analysis indicated that the metalworks that represent Volta region are chisel, hammer, saw, axe, gun and digging pry bar. They produce chieftaincy regalia but on a small scale as compared to others.
- The study highlighted metalworks produced in the Upper West region mainly as farming implements, cooking utensil, and fabrication products like metal gates, bow and arrow for hunting and defense.
- The study reveals that the metal design and fabricators in Upper East region are familiar with the production of cattle plough pull, hoes, arrow heads, and cauldron (metal coo-king pot).
- Ashanti region is known for chieftaincy regalia, linguist staff, jewellery for body adornment and packaging trunks as metalworks produced by metal design and fabricators in the region.
- The study unfolded that the Oti region is well appreciated for farming, carpentry and fishing tools. These include; hoe, claw bar, saw, fishhook, arrows and utensils.
- In the Western North region, the metal design and fabricators produce metalworks such as cutlass, digging pry bar, arrows, pinch point pry bar and royal regalia for chiefs.

3.2.3 Metalwork technology applied by the metal designers and fabricators in Ghana

In the spectrum of the introduction of metalwork technology in Ghana, four major types of metal fabrication technology were identified. These were casting, forging, goldsmithing and black smithing technology.

Northern Territories:

The Mendes taught the Northern Territories casting and forging technology in producing farming implements, utensils and hunting weapons. Ferrous metal was mainly used in their production.

Bono State: The Bono State learnt metalsmithing to produce regalia, decorative items and farm implements. They also practiced goldsmithing, blacksmithing and gold weighing. The Ivorians and the northern territories influenced their metalwork technology.

Ashanti: The Ashanti's metalwork technology is anchored on casting, forging, jewellery and working tooling technology. **Trans Volta Togoland:** The Germans taught Trans-Volta Togoland indigenes decorative, jewellery, and forging technology.

Gold Coast Colony:

Gold Coast Colony metalworks technology is oriented toward jewellery, artifact design and working tools production.

3.2.4 What influenced the types of metalwork produced along the belts in Ghana?

It was discovered that the types of metalwork produced were influenced by the occupation of the people and the exigency in that community. The coastal belt indulged in office work, chieftaincy, cocoa farming, and fishing, middle belt was engulfed in chieftaincy, weapons, mining, cocoa farming, plantation and the northern belt were into hunting, weapons, farming, and quarry. The study indicated that farming and fishing implements constitute 41.25% of metalworks produced. Utensil production is 20.3%, Jewellery is 16.56%, weapons and hunting tool is 15%, carpentry tool is 4.7% and other metalworks is 2.19% produced by metal design and fabricators in Ghana.

3.3 Objective three was to use chasing and repousse techniques to depict the identified types of indigenous jewellery and metalwork that are associated with each region on the Ghana map to serve as an educational material for the jewellery and metalwork industry and general public.

With the findings in objective two, the dominant metalworks among each region were selected to depict the regions on the Ghana map through chasing and repousse technique.

- The metalworks that represented each region could not be in-depth chased and repousse and due to the sizes of the design and the thickness of the aluminum plate. This was also a result of

the dimension of the metal plate, the number of metalworks selected for each region as well as boundaries and the indication of Volta River on the map. All these factors limited the depth of repousse and chasing as well as the size of the repousse and chased work.
- The size of the aluminum plate (40''x 33.5'') presented a lot of difficulties in working on a pitch to come out with the chased and repousse effect.
- Finishing the surface of work and polishing led to the use of emery paper, oil and cotton that gave a mirror finished work.
- The large surface nature of aluminum plate made it bend or curved after working the surface. This unlevelled nature made it difficult to fix the aluminum plate onto the scorched wood substrate.
- The unlevelled nature of aluminum plate made researchers introduce nails to secure edges of the aluminum plate aside from the adhesive applied to hold it onto the scorched wood substrate.
- Application of enamel added to the aesthetic beauty of the finished work. The enamel was applied to demarcate the river Volta on the map. This aided in breaking the monotony of one colour on the surface of the metalwork.

3.4 Appreciation of the finished work

The finished repousse and chase educational artwork as seen in Figure 82 is measured 58.5 inches in height, 35inches in length and 30 inches in width.
- The shape of the work was Ghana map which depicts the versatility and the strength of metalwork technology of the Ghanaian people. It tells the uniqueness of the Ghanaian when it comes to jewellery and metalwork as well as their similarities and differences.
- The work exhibits clear definition of each region as implied in the objective of the study. The chasing and repousse techniques were used to obviously demarcate the boundaries of each region to give clarity when observed. It shows how distinct the regions are but one country.
- Aluminum plate was used to depict silver colour which represents second in rank but used to celebrate victory in Ghana (Amenuke, 1991). The researchers believe that metalworks play second most important role in Ghanaian life aside crops that provide food.
- The polished aluminum metal surface is reflective of anything opposite it. The aluminum metal was thoroughly polished to the mirror finished state. This mirror finished surface made it possible for the work to attract human attention. The scorched wood with dark shade effect was used as the background to the mirror finished surface work. Aesthetically, it gave a dark border effect to the finished work. The effect created variety, contrast, harmony, among others indicating the effective use of elements of art and principles of design.
- The application of blue enamel brought to natural observation how rivers look like and the actual view of the map of Ghana. The colour blue was used to depict the river Volta. This colour of enamel applied gave colour variation to the work. At a distance, the colour blue gives a nice blend with the silver surface colour of the finished work making it very much attractive and pleasant to appreciate.
- A wheeled stand made of silver sprayed added beauty in colour and mobility to the work. The fabricated stand made it possible for one not to touch the work but move it wherever. In terms of maintenance, the stand is made in such a way that it can be detached from the repousse and chase work but reassembled again.
- The repousse and chased images showed well-composed items in a balanced arrangement for each of the regions. A minimum of three (3) and a maximum of five (5) jewellery and metalwork items were used to tell the indigenous metalwork history of each of the regions. Notable on the surface of the repousse and chased work is that the areas raised reflect more light than areas that sunk on the metal plate. There is an even distribution of rinsed and non-rinsed areas of the repousse and chased work. The finished work looks attractive and appealing to the eyes both near and afar. The finished work serves its purpose because it tells the origin and scope of the work (Ghana), the issues been discussed (indigenous metalwork) and targeted audience/groups (jewellery and metalwork industry and the general public).

4.0 Conclusion

Industrialization of metalwork in Ghana started centuries ago but with indigenous metalwork, which was mostly fabricated through blacksmith, forging and casting processes. The study acknowledged the fact that in Ghana, metalworks produced are much inline or in other words influenced by the occupation of the indigenes and specialization of the metal design and fabricators in a particular area at a time.

It can be concluded that there has been an enormous improvement in the types of metalwork

produced in Ghana as juxtaposed to the Gold Coast.

The study noted that regions such as Ashanti, Eastern, Volta, Greater Accra, Western and Central regions are producing jewellery to some extent but it is incomparable to the indigenous metalworks in those regions. The study indicated that farming and fishing implements constitute 41.25% of metalworks produced. Utensil production is 20.3%, Jewellery is 16.56%, weapons and hunting tool is 15%, carpentry tool is 4.7% and other metalworks is 2.19% produced by metal design and fabricators in Ghana. The technique (chasing and repousse) employed in executing the work at the studio gave room for researchers to explore the mechanical properties of the aluminum metal. The design, size of metal and techniques ensured that the researchers exercised patience, applied different levels of strikes, explored variety of chasing and repousse tools and worked at different angles of the metal plate at the studio. Chasing and Repousse have proven to be viable techniques that distinguish themselves and imply in defining and decorating metalworks to convey significant messages.

5.0. Recommendation

The following were the recommendations made with regard to the study.

- History of metalworks in Ghana must be extensively carried out in all the sixteen regions particularly the new regions to provide more literature for further studies in that field. Students and lecturers should take up this challenge as projects and thesis.
- A study must be conducted on the current development of new trends of metalworks produced in Ghana. Ghana Tertiary Education Commission should ensure a new curriculum is developed along that line for students' and lecturers' benefits.
- Students, lecturers and professionals in the jewellery and metalwork industry should explore the study using different techniques and integration of other materials to ascertain new ideas and technology.
- The study is also recommended to the Ghana Tourist Authority, Center for National Culture, Ghana and Ghana library Authority to serve as reference material to the public and academia.

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