

Clay and Its Usage in Contemporary Pottery Practice in Southwestern Nigeria

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Abstract – Clay is arguably the most available ceramic material in the world. Its typology is characterised by geological formation as well as physical and elemental composition. Clay is being used for various pottery and ceramic activities across the globe as a result of its malleability and high thermal property. Scholaristic publications on various types of clay and its usage are abounding in diverse field of studies including ceramics. Still there is scholarship gap on clays that are used in contemporary pottery in Southwestern Nigeria. This study therefore identified twenty clay deposits that were actively used by indigenous potters, formal art schools and workshop and small scale ceramic industries in Ekiti, Ogun, Ondo, Osun and Oyo States. It analyses its elemental compositions and examines various contemporary usage of clay among potters. Direct field survey, laboratory examination and participatory observation methodologies were employed. Results of PIXE analysis revealed silica, alumina and iron were the dominant elements with other elements in varying proportions. Moreover, the study observes that the potters were using manual means of prospecting and preparing their clays. Handbuilt and throwing are the major methods of production while casting and jiggering and jolleying techniques are seldom used. Pottery products in Southwestern Nigeria perform various utilitarian, decorative, social, ceremony and religious purposes, they however are limited in typology when compare to pottery and ceramic wares from industrialised countries.

Keywords – Clay, Clay Usage, Pottery, Pottery Practice, Southwestern Nigeria.

I. INTRODUCTION

Clay is a major pottery material and it is common in almost everywhere in the world. It is an earthy material that becomes plastic when mixed with water, enabling kneading and shaping of clay to produce valuable vessels which permanently harden when fired to a relatively high temperature. Clay is formed by continuous disintegration of the igneous-granite rock through the process of weathering, transportation and sedimentation. Composition of clay varies, resulting from the mother rock that formed it. Alumina and silica are predominant chemical elements in clay mineral as given in the chemical composition of ideal clay which is $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$. Other oxides in clay may be considered as impurities that mingled with it as a result of its contact with various organic and inorganic materials during transportation and sedimentation [1].

In Southwestern Nigeria which comprises of Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States and approximately lies between latitude 6° and 9° North and longitude 2° 30' and 6° East, various types of clays are found in abundant as a result of its topography scenery which include highlands and plains as well as good drainage system and steady climatic changes support the formation of both primary and secondary clays. This however has undoubtedly contributed to the vibrant production of pottery across the region from the ancient time to this present time though it has undergone several developments [2], [3], [4], [5].

Availability of clay deposit has also being one of the factors that influencing establishment of pottery centres in the Southwestern Nigeria since clay is the major pottery material. Increase in demands of pottery wares make extant traditional pottery centres that are still prospecting various types of clays for pottery production. Moreover, Western education, technological advancement and ceramic entrepreneurship have also improved clay usage for several pottery activities in the zone among art schools that offers Ceramics courses as well as small ceramic industries [6], [7] (table 1).

Table 1: Notable Indigenous Pottery Centres, Cottage Pottery Studios and Tertiary Institutions that Offer Ceramics Courses in the Southwestern Nigeria

S/N	States	Indigenous Pottery Centres	Cottage Pottery Centres	Tertiary Institutions that offers Ceramics
1.	Ekiti	Igbara-Odo, Ikere-Ekiti Ijero-Ekiti, Isan-Ekiti	Boluwaji Ceramic Industry, Ado Ekiti Faniran Ceramic Ikere-Ekiti Fiyinfolu Ceramic Ikere-Ekiti Ona Ara Ceramics, Ado Ekiti	Federal Polytechnic, Ado-Ekiti Ikere College of Education, Ikere-Ekiti
2.	Lagos	Badagry	Wonderful Ceramics, Igando Dabow Pottery, Ogba, Ikeja Pojo Pottery Centre, Badagry Earth and Fire Clay Work, Lekki Phase 1, Lagos Heritage Ceramic Company, Iyana-Ipaja	University of Lagos, Akoka Lagos State University, Ojo Yaba College of Technology, Yaba, Lagos State University of Science and Technology, Ikorodu Federal College of Education, Akoka, Adeniran Ogunsanya College of Education, Ijanikin,
3.	Ondo	Erusu (Aga, Okesan, and Osinna quarters) Oke-Agbe, Isua, Owo	Yinka Ceramic Ware Nigeria Enterprises, Owo Kenny-Ronke Ceramic Akure	Federal University of Technology, Akure Adeyemi University of Education, Ondo
4.	Ogun	Abeokuta, Imoto-Yewa Igbogila. Tata, Imope, Igbanran	Smattee Pottery and Design, Magboro, Ogun State	Olabisi Onabanjo University, Ago Iwoye, Tai Solarin University of Education, Ijebu-Ode Mountain Top University, Mowe Mashood Abiola Polytechnic Federal Polytechnic, Ilaro Federal College of Education, Abeokuta
5.	Osun	Ipetumodu, Mooro, Edun-Abon, Ile-Ife, Ilesa, Ikirun, Iresi, Ikire Ijabe	Shallom Pottery Centre, Ile-Ife Atamora Pottery Centre, Atamora, Ikire	Obafemi Awolowo University, Ile-Ife, University of Ilesa, Ilesa Osun State Polytechnic, Iree. Osun State College of Education, Ila-Orangun, Osun State College of Technology, Esa-Oke
6.	Oyo	Ibadan, Oyo, Ogbomoso, Iseyin, Saki, Okeho, Awe, Fiditi, Igbeti Igboho	God's Grace Ceramic Industry, Old Ife Road, Ibadan Saubana and Sons Ceramics, Orita Challenge, Ibadan Dapo Art Gallery, Kosobo Area, Oyo	Ladoke Akintola University of Technology, Ogbomoso Emmanuel Alayande University of Education, Oyo, Lead City University, Ibadan The Polytechnic Ibadan, Ibadan Adeseun Ogundoyin Polytechnic, Eruwa Federal College of Education (Special), Oyo, The College of Education, Lalate

Source: Authors' Field Survey

There are several scholastic studies on clay and clay deposits. Rhodes [1], Peterson [8] and Fournier [9] independent publications give comprehensive materials, techniques and processes in ceramic art. Their studies are studio based that examine the formation, nature, preparation and fundamentals of clay, various methods of pottery making, ceramic design, decoration and glazing. They also highlight that clay which is relatively pure in nature is found at the base of the mother rock that formed it. They further observe that secondary clay is the clay that have been pulverised by frost or glacial grinding, washed by rain, blown by wind and transported to distant place by the eroding action of moving water which allows it to mix with various impurities before it get to the final destination.

Ojie and Esosuakpos [10], Effiom [11] and Alege and Alege [12] separate studies analyse chemical composition of clay samples from Emonu Delta State; Akwa Ibom and Cross River States; and Ajelele, Ahoko, Eniji, and Itobe villages in Kogi State through the aids of Atomic Absorption Spectrophotometre (AAS); Induced Coupled Plasma Spectrometry; and X-Ray Fluorescence Spectrometry (XRF) respectively. Their studies observe that concentrations of silicon, aluminum and iron are high in the selected clay samples compared to other elements. Ojie and Esosuakpos [10] further conduct test on plasticity,

moisture content, shrinkage and porosity rate of the clay while Alege and Alege [12] also examine shrinkage and strength characteristics, modulus rupture and firing behaviour and colour in accordance with American Society of Testing Material (ASTM) to determine their suitability in ceramic processes and production.

Eniola, Oladunjoye and Gbadamosi [13], Fakolujo, Olokede, Aiyedun, Anyanwu and Lee [14] and Olokede, Aiyedun, Kuye, Adekunle and Lee [15] studies examine chemical and physical properties of clay in some clay deposits in Southwestern Nigeria. The result show that heavy metals such as silicon, alumina, iron, magnesium, manganese calcium, sodium, potassium, phosphorus, titanium and tin oxides as well as other trace elements are also present in proportional ranges across the study areas. Eniola, Oladunjoye and Gbadamosi [13] further notes clay from Ajebo area of Abeokuta is being used as a flux in cement production by West African Portland Cement (now Lafarge-WAPCO).

Adegoke, Ogunsile and Adekunle [16] observe variation of thermophysical properties of clay collected at a depth of about 1.5m from clay pit at Ibadan Bricks and Clay Products Industry mining site, Omi-Adio, Ibadan, Oyo State with adsorption optimisation. The study further observes that clay has some properties which make them good absorbents and that thermal conductivity of clay increases with the increase in the concentration of heavy metal ions being absorbed by clay to a considerable level which usually leads to increase in temperature in the soil.

Cardew [17], Adepegba [18] and Oyelola [19] separate studies further note that pottery is the products of fired clay that is common in nearly every community in Nigeria. They opine that pottery is extensively practiced in some areas compared to the others due to availability of clay. Fatunsin [2] peruses the raw materials, methods of production, decorations forms and types, local variations as well as continuity and change in pottery tradition of Yoruba people of Nigeria. She observes that various types of clay are found abundantly in Southwestern Nigeria mostly near the streams and rivers as well as other topography and that some of this clay are named after their place of origin, colour or certain characteristic.

Kalilu, Akintonde and Ayodele [3] highlights that clay is from one origin invariably from feldspathic rock but there are different chemical compositions in it. It further reveals that secondary clay is the most common clay in the Southwestern Nigeria which varies in colour, formation and composition. Their study further notes that names for clay in each pottery centre are basically descriptive of its locations, sedimentary appearance or quality. It also observes that clay prospecting, preparation and preservation of clay as well as composition of clay bodies by the potters in the zone is majorly through manual and empirical methods and surveys techniques of production in Southwestern Nigeria.

Abiodun, Akintonde and Akinde [4] and Abiodun [6] observe that availability of different type of clays contributed to the development of traditional pottery centres, various categories of experimental pottery workshops and studios as well as ceramic industries in the Southwestern Nigeria. They further noted that composition of clay bodies has enhanced the strength of pottery production and products in the region.

Abiodun and Akintonde [20] examines physical and chemical characteristics of selected clay samples in Southwestern Nigeria vis-à-vis chemical composition, water of plasticity, workability, shrinkages and water absorption capacities to determine their suitability for ceramic production. Akinde [21] study on development of cobclay bodies hinge on formulated from clay from Orile-Igbon with corn cob in varying proportion with the aim of its adoption for various ceramic activities

However, only very few among these studies focus on various clay deposits and its usage in contemporary pottery practice in Southwestern Nigeria which need to be studied as most of these studies are affected by recent urbanisation and construction development.

This study however, identifies twenty (20) clay deposits where indigenous, studio and workshop, formal art schools potters usually collected their clays for various pottery activities in Ekiti, Ogun, Ondo, Osun and Oyo States. No clay deposit was selected in Lagos State as most of the clay deposit has been affected by construction and development. The study also examines their elemental components of the clay samples through non-destruction elemental analysis. It also discusses various methods of clay preparation, techniques of production and pottery products in order to survey usage of clay among the indigenous and contemporary potters and ceramists in the region.

II. LOCATIONS, TYPOLOGY AND COLLECTION OF CLAY IN SOUTHWESTERN NIGERIA

Primary clay (kaolin) is residual clay which is highly refractory with maturing temperature of above 1400°C. They are seldom used alone because of their poor plasticity and as such, usually mix with other clays to reduce shrinkage, produce hard and dense porcelain body, refractory bricks and also for compounding glaze batches and other ceramic bodies. This type of

clay is not wide spread like the secondary clay in the Southwestern Nigeria (Akintonde, Abiodun and Akinde, 2014: 282 and Abiodun, 2018b). However, different kinds of kaolins are found at the base of highlands in Ijero Ekiti and Ikere-Ekiti in Ekiti State, Ipinsa and Igbara Oke in Ondo State, Abeokuta in Ogun State, Igbeti in Oyo State as well as Titibi and Iwo in Osun States.

Secondary clays on the other hand, are varied in types, colour and texture due to organic and inorganic materials that have mixed with them during sedimentation. They are found abundantly around the streams and river banks, valleys, gullies, and quarry sites in rural and urban centre in the Southwestern Nigeria. Today, with the development of more rural and urban localities most especially in the area of various construction activities, borehole, dams, drainage and well digging among others, new clay sites are often revealed while some existing sites are gradually going into extinction sites (plates 1 – 3) [5], [7], [22]. This led to availability of several clay deposits to various categories of clay users especially the traditional potters, studio and industrial ceramists as well as art schools students to collect their clays anywhere workable clays are located. However, rapid developments of rural and urban centres have also made it difficult for the potters to have designated clay deposit in the recent time.



Plate 1

Clay Deposit that was exposed during construction of Ogbomoso-Ilorin Expressway in Orile Igbon, Oyo State
Photograph by Segun Abiodun



Plate 2

Clay deposit at esPRO Quarry site, Ikire, Osun State
Photograph by Segun Abiodun



Plate 3

Clay deposit at Ipinsa, Akure, Ondo State
Photograph by Segun Abiodun

In Southwestern Nigeria, the generic name for clay is *amo* among the Yoruba; its variations also have different local names across the zone which is related to their formations, localities, texture, workability (plasticity) and colour. For example varieties of white clays which could be a primary clay or newly formed secondary clay that is closed to the mother rock are known as *amo funfun*, reddish clays that are relatively consisting of large amount of iron oxide is referred to as *amo pupa* while grayish or blackish clays which are mostly contain carbonaceous material are called *amo dudu* [2], [3].

Clay usage for pottery production starts from clay mining to clay preparation, modeling of various objects with various techniques and firing. Collection of clay is the preliminary stage of practical pottery across the globe which could be either through purchasing industrial processed clay or digging out from the clay deposit. The latter is mining of clay from its deposit is however most tedious step in the art of making pottery but a better exercise that enable the potters to collect and formulate their own clay bodies cheaply.

There are numerous clay deposits in the region that have been identified by various governmental and non-governmental agencies, academia, researchers, traditional potters, studio potters and art school ceramists in their quest to search for suitable clay(s) for various purposes. Collection of clay among the indigenous Yoruba potters is usually communal exercise because of the stress involve and it is mostly done during the dry season because of pit collapse during the rainy period as many deposit are closed to the rivers and streams. Traditional potters usually collect their clays by themselves or through the assistance of hired men from designated clay deposits with pick-axe, cutlass, hoe, and shovel (plate 4) while calabashes, basins or sacks are used to pack it to the storage arena which could be either open ground or clay pit in the pottery centre (plate 5). Few of the contemporary studio potters, ceramic entrepreneurs and art schools collect their clays by themselves (plate 6) while most of them buy their clays from various source of their choice [2], [22], [23], [24].



Plate 4

A potter collecting clay in Isan-Ekiti
Photograph by Segun Abiodun



Plate 5

An open clay storage point in a pottery
centre in Ipetumodu
Photograph by Rebecca Ayenuro



Plate 6

Some LAUTECH students collecting
clay at a depot in Titibi, Osun State
Photograph by Damilola Oyewo

However, twenty (20) clay deposits that are actively used by indigenous pottery centres, cottage pottery industries and art schools across the rural and urban centres were indentified in Erusu, Oke Agbe Aba Oyo and Ipinsa, Akure, in Ondo State; Igbara-Odo, Isan-Ekiti Araromi and Oke Osun, Ikere-Ekiti in Ekiti State; Ilesa, Ikire, Inisa and Titibi in Osun State; Ibadan, Lanlate, Orile-Igbon and Oyo in Oyo State; Abeokuta, Igbanran, Ijoko and Mowe in Ogun State. No clay deposit was selected in Lagos State because recent urbanization in the metropolis has affected the existed clay. Geo-reference of the various clay deposits were made with Global Positioning System (GPS) of Google Widget through an android mobile phone in order to record their longitudinal and latitudinal coordinates (table 2).

Table 2: Coordinates of Selected Clay Deposits in Southwestern Nigeria

State	Clay Deposit	Latitude	Longitude
Ekiti	Isan Ekiti	7.9341°	5.33857°
	Igbara Odo	7.489131°	5.063677°
	Oke Osun, Ikere-Ekiti	7.485752°	5.234083°
	Araromi, Ikere-Ekiti	7.499619°	5.244167°
Ogun	Igbanran	6.913118°	3.94474°
	Ijoko	6.743007°	3.300032°
	Mowe	6.769228°	3.341940°
	Olumoore, Abeokuta	7.147318°	3.319068°
Ondo	Aba Oyo, Akure	7.28918°	5.155628°
	Ipinsa, Akure	7.311225°	5.134608°
	Erusu	7.538594°	5.809892°
	Oke Agbe	7.633838°	5.766915°
Osun	Atamora, Ikire	7.424163°	4.270763°
	Ilesa	7.609028°	4.702637°
	Inisa	7.970059°	4.65846°
	Titibi	7.624484°	4.438811°
Oyo	Lanlate	7.627395°	3.44939°
	Olodo, Ibadan	7.42606°	3.993825°
	Orile Igbon	8.24553°	4.301515°
	Oyo	7.899642°	3.978128°

Source: Authors' Field Survey

Twenty (20) clay samples were thereby sieved and elemental compositions of the samples were analysed with photo emission non-destructive character of ion beam analysis (IBA) through Particle Induced X-ray Emission (PIXE) on NEC 5SDH 1.7 MV Tandem Pelletron accelerator machine. The result shows as shown in table 3 reveals that selected clay samples have high content of silica (Si), alumina (Al) and iron (Fe) as well as other elements in varying contents base on the location of the clay.

Table 3: Elemental Concentrations of Selected Clay Samples in Southwestern Nigeria

State	Clay Deposit	Element Concentration (ppm)												
		Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Zn	Rb	Sr	Zr
Ekiti	Isan Ekiti	0.82	9.92	13.00	0.05	1.08	27.35	2.32	0.05	6.36	0.02	0.01	-	-
	Igbara Odo	0.54	14.86	26.01	0.03	2.70	0.58	0.82	0.06	7.57	0.02	-	0.58	-
	Oke Osun, Ikere-Ekiti	0.49	10.94	29.11	0.11	2.27	0.86	3.59	0.05	4.64	-	-	-	-
	Araromi, Ikere-Ekiti	0.03	24.02	24.37	0.02	0.23	0.03	0.83	0.01	0.52	0.01	-	-	-
Ogun	Igbanran	1.14	17.08	21.61	0.07	0.37	1.91	1.81	0.11	10.18	0.05	-	0.01	-
	Ijoko	0.17	16.87	24.66	0.09	0.35	0.08	1.09	0.01	9.65	-	0.01	-	0.01
	Mowe	0.34	10.99	32.54	0.02	2.28	0.18	0.83	0.02	3.54	0.02	-	0.03	-
	Olumoore, Abeokuta	0.71	10.95	30.49	0.13	1.99	0.49	1.27	0.18	5.55	-	0.01	0.01	0.02
Ondo	Aba Oyo, Akure	0.73	11.63	26.68	0.07	0.43	0.85	3.68	0.14	9.01	0.01	-	-	0.02
	Ipinsa, Akure	0.05	23.14	22.79	0.04	0.01	0.01	2.02	-	3.06	-	-	-	-
	Erusu	0.50	14.75	26.36	0.05	1.24	0.66	0.87	0.03	8.45	0.03	-	-	-
	Oke Agbe	0.48	17.16	22.81	0.06	0.77	0.47	0.48	0.05	11.49	0.04	0.03	-	-
Osun	Atamora, Ikire	1.85	15.09	22.88	0.04	2.39	0.79	0.85	0.03	9.44	-	0.04	0.05	0.09
	Ilesa	3.77	14.05	21.68	0.22	1.08	1.41	1.05	0.09	11.75	-	-	0.04	-
	Inisa	1.34	19.81	20.75	0.05	0.49	0.26	0.75	0.08	10.43	-	-	0.03	0.07
	Titibi	0.16	23.23	24.62	0.04	1.38	0.05	0.01	0.01	0.91	-	0.06	-	-
Oyo	Lanlate	1.05	18.64	24.63	0.03	0.78	1.71	0.39	0.03	4.93	-	-	0.03	-
	Olodo, Ibadan	0.93	19.74	21.49	0.02	0.11	0.53	0.58	0.10	10.26	0.02	-	0.02	-
	Orile Igbon	0.59	16.65	20.65	0.02	0.74	0.35	0.90	0.03	15.84	0.01	0.01	0.01	-
	Oyo	1.13	13.02	28.03	0.04	1.01	0.39	0.79	0.04	8.01	0.01	-	0.01	-

Source: Authors' Laboratory Analysis

III. CLAY PREPARATION

Preparation of clay among potter in Southwestern Nigeria is usually done by pounding clay in the mortar (plate 7) or crushing it in the hammer mill or pug mill. Pulverised clay may be further sifted in a sieve in order to remove big particles or grains from it before mixing it with other clays with adequate water which will be kneaded thoroughly for further production depending on the body type. Clay is also prepared by soaking the mined clay directed inside the big pot, bowl, clay pit or any container for some day before it will be mixed together by removing foreign matters such as pebbles and subsequently kneaded so as to expel air bubbles in the clay mass for handbuilt technique (plate 8). Soaked clay may also be sieved to fine clay slip and dried in a plaster mould, cotton sack or cloth (plate 9). Some pottery studio, ceramic industries and art school are using pug mill to prepare their wet clay. Potters in the Southwestern Nigeria usually mixed two or more types of clay together to control plasticity, colour, strength, porosity and texture during production which shows that the theory of clay bodies formulation is also practice [4], [25].



Plate 7

Preparation of wet clay by removing pebbles

Photograph by Segun Abiodun



Plate 8

Mixing of soaked clay in preparation for sieving

Courtesy: Rofiat Abdulsalam



Plate 9

Sieving of soaked clay into fine slip
Photograph by Segun Abiodun

IV. TECHNIQUES OF POTTERY PRODUCTION

Chemical and physical properties of clays across Southwestern Nigeriamake it suitable for the potters to use those clays for various pottery productions. Potters in the zone are using clays based on their experience with various methods of production. Among the indigenous potters in Southwestern Nigeria, hand-built technique is traditional method of pottery making and it is usually done through direct or indirect/pre-mould system. Recent technological advancement had made adoption of mass production techniques like throwing, mould cast and jiggering and jolleying into the practice [4], [25].

Handbuilt technique is the traditional means of making pots with coil, slab, pinch or mould through direct or indirect/pre-mould method. In direct handbuilt technique, production of a pot is often commenced by putting a lump of clay on a flat base and a rim of the pot is made from it. The process continues by pinching the clay down and adding more to it until desire size of the pot is achieved. The pot is left for some time to dry in the sun before the excess clay is eventually scrapped off and burnished with either plastic or stone before proceeding to decorating the pot (plates 10-12).



Plate 10

A potter begins to pinch a pot directly after forming a rim of a pot at Erusu-Akoko
Photograph: Segun Abiodun



Plate 11

Direct pinched pots were placed inside the sun in order to become leather hard
Photograph: Segun Abiodun



Plate 12

A Potter is scrapping excess clay leather hard pot in Isan Ekiti
Photograph: Segun Abiodun

Indirect handbuilt technique on the other hand starts with the casting of the base of the pot on the bottom of an already fired pot which serves as a mould usually called “*Osuwon*”. Building the body wall of pot continues when the cast base is leather hard by adding lumps of rolled clay coils, blended and pinched together with both hands in order to maintain even thickness of the wall until the desired height is achieved and then proceed to rim forming which is usually done by attaching big coils of clay to the top of the pot and then smoothed with damp rag or leaf. The pot is thereafter scrapped smoothed and polished with snail shell, or scrapper or spatula (plates 13-15) before it is decorated [2], [23], [25]. Slab method is usually used by the formal trained potters to produce complex shaped objects by making the slabs from lump of clay, cut it into sizes and then join the slabs together. Handbuilt technique is also used to produce ceramic-sculpture.



Plate 13

Forming the base of a pot on already fired pot
Photograph: Segun Abiodun

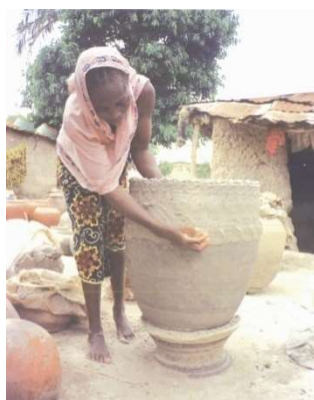


Plate 14

Potter attaching and blending clay coils to the cast base
Photograph: Segun Abiodun

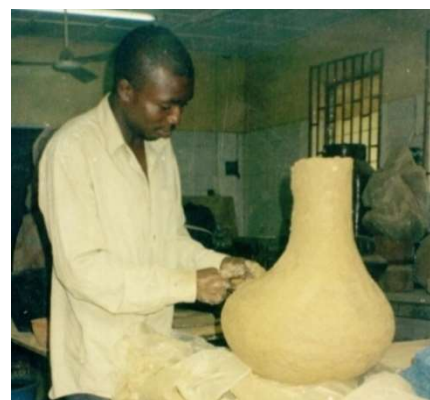


Plate 15

Segun Abiodun modeling a flower planter with combination of coil and pinch methods
Courtesy: Authors' Archive

Throwing is a common mechanised method of mass producing pottery wares among workshop, studio and college trained potters. It is the act of forming pottery wares on a revolving potter's wheel. The technique was developed in Egypt, China and Mesopotamia about 5,000 years ago. It was introduced to Nigeria by D. Robert around 1904, though his attempt did not yield a substantial result; it was Michael Cardew's effort that succeeded in training the first set of Nigerian throwing exponents in Abuja between 1950 and 1965 [22], [26]. Working on the potter's wheel is a skill that requires constant practice, but it is a skill that anyone can learn. It involves centring of clay on the revolving wheel under the pressure and control of

potter's hand by coning and pressing it down in order to remove air bubbles and make the base wider. The centred base would then be opened from the middle and the clay mass is gradually pulled up to a form cylinder depending on the size of the ware intended to produce and then shaped into desired form by carefully pushing the cylinder out or in gradually depending on the form. Excess clay is then trimmed off from shaped pot and then smoothened for proper finishing (plate 16) [22].



Plate 16

Students of Department of Fine and Applied Arts,
LAUTECH, Ogbomoso working on potter's wheels
Photograph by Segun Abiodun

Mould casting method is an act of using hollowed mould(s) to produced pottery wares through press or slip casting. Slip casting is an industrial method of mass producing identical ceramic wares by pouring clay slip into a porous hollowed multi-pieces plaster mould and allowing a thin wall of clay to be deposited on the inner surface of the mould as a result of capillary attraction. The excess slip is poured out when desirable thickness is formed. It takes some hours before mould could be separated depending on the size of the wares and composition of the clay slip (Abiodun, 2011). The clay slip composition preparation varies depending on type and composition of clay body and deflocculant (plate 17) [4], [22].



Plate 17

Pouring clay slip into plaster moulds at Women
and Youth Art Foundation's Studio, Ibadan
Source: Layiwola [27]

Press casting on other hand can also be done by pressing lump of clay through either manual means via plaster, metal, silicon and cement mould or mechanical device with hydraulic system and metal mould (plates 18-20). It is also used to produce bricks that were used to construct kiln in the zone [6], [22].



Plate 18
Casting of tile through pressing method in a plaster mould
Photograph by Segun Abiodun
Photograph by Damilola Oyewo



Plate 19
Hydraulic pressing metal mould for ceramic water filter at Atamora Pottery Studio



Plate 20
Ibunkunoluwa Ayoola dressing cast ceramic water filter
Photograph by Damilola Oyewo

Jiggering and Jolleying techniques are essential for industrial operation for identical simple hollow and flat wares through jigger and jolly machine. It involves the use of pivoted arms with a template mounted on a jigger or jolly machine or potter's wheel and a plaster/metal mould(s) placed on a revolving shaft in order to either jigger a hollow ware or jolley a flat ware. This technique requires some basic skills for effective production as clay needed for jiggering and jolleying is the clay with little plasticity, so that it can be removed easily from the mould. It is rarely used in pottery production in Southwestern Nigeria [22].

Decoration of pottery wares is a well established tradition among the potters of Southwestern Nigeria. Pottery decorations are usually done through roulette, stamping, burnishing, etching (incised), pigment painting, relief coils and sculptural images for aesthetics, functional, economic, ceremonial and religious purposes. The designs are normally adapted from either or combination of geometric, anthropomorphic and zoomorphic motifs (plates 21-22) [2], [24], [25], [28].



Plate 21
A potter is impressing roulette design on a pot with twisted twine
Photograph by Segun Abiodun

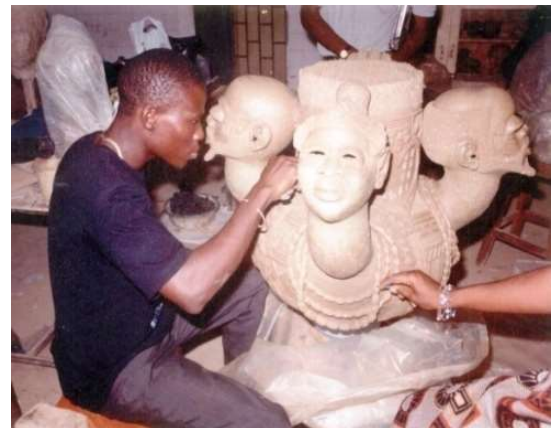


Plate 22
Toyin Akinde designing handbuilt pot with coils etching and sculptural images at LAUTECH
Courtesy: Toyin Akinde

Firing, the act of making moulded pots permanent through the heat. It is the final and important aspect of pottery production because pottery wares in raw clay is not useful until it is fired to a relatively high temperature changing its chemical and physical compositions. Open firing method which is usually done in an open space in various ways is most common firing technique among indigenous potters in Southwestern Nigeria. It is usually done by putting grasses and sticks under the pots and stacking them on one another and then surrounded the stacked pots with grasses, straw and twigs which

may or may not be covered with broken pots or zinc roofing sheets before it set on fire. More grasses, straws or twigs were added as firing continues until pots turn red hot as a result of iron and manganese oxides that are present in clays of the zone. This process of firing usually lasted for about three to six hours (plates 23).



Plate 23
Yoruba indigenous open firing technique in Saki
Photograph by Abokede Gbenga

Fired pots are allowed to cool down or basted by dipping them into the admixture of locust beans (*Parkia biglobosa*) pods for sealing the pores and add shiny effects to the wares. However, some indigenous potters also adopted reduced oxidation firing technique and basting to produce black pot by spreading wet grasses or saw dust on red hot fired pots in order to create a carbonised effect on them. The pots would later be removed one by one from reduced oxidation firing with stick and then basted by dipping it into a prepared concoction in order to seal the pores and keep the black shiny.

In this contemporary era, open firing method has been supplemented with low circular wall open kiln constructed with laterite. The size of the kiln also usually determine the number of firebox(es) (plates 24 and 25). Temporary kiln is also adapted to fire wares in this recent time. This is done by arranging bricks on the open space for firing which could be dismantled after the exercise (plate 26) [29]. Pots were usually stacked inside the mud wall and covered with fired pots or zinc or asbestos roofing sheet. Maturing temperature of indigenous pot wares is determined empirically.



Plate 24
Open kiln firing method in
traditional pottery centre
at Ita Iyalode Abeokuta
Photograph by Paul Seyi-Gbangbayau



Plate 25
Open kiln at LAUTECH, Ogbomoso
Photograph by Segun Abiodun



Plate 26
Temporary kiln for firing
at LAUTECH, Ogbomoso
Photograph by Segun Abiodun

Various types of up and down draught kilns with different fuels such as wood, gas, oil and kerosene as well as electric kiln are now being constructed by pottery studios/workshops, art schools and small scale ceramic industries with clay bricks, pot shards and or direct laterite moulding. (plates 27 - 29). Construction of various types of kiln among the potters in Southwestern Nigeria with various types of clay is possible as a result of properties of clay that withstand high temperature. Bricks used in construction of these kilns were produced locally through mixture of kaolin, ball clay, laterite and sawdust as the case may be through press casting [4], [30]. Maturing temperatures of pottery wares fired in these kilns were usually determined by using pyrometric cone, digital pyrometre or through empirical method.



Plate 27
Gas Down draught kiln at
The Polytechnic Ibadan
Photograph by Segun Abiodun



Plate 28
Wooden Bottle Kiln at Adeseun
Ogundoyin Polytechnic ,Eruwa
Photograph by Segun Abiodun



Plate 29
Pot and Potsherd Kin at The Federal
University of Technology, Akure
(Ohimai, et al, [31])

V. TYPES AND FUNCTIONS OF POTTERY PRODUCTS

Pottery products in Southwestern Nigeria are very limited in types compare to various types of ceramic products in industrialised countries glazed tablewares, kitchenwares, tea and coffee sets, sanitary wares as well as floor, wall and roofing tiles. Products of traditional pottery centres, cottage pottery studios as well as tertiary institution are diverse in forms and types and include embellished terracotta and few glazed earthenware cooking, water and storage pots, and serving plates, casserole bowls, cups, dinner and tea sets, flower, pots and vases, candle stands, charcoal stove, water fountains, pen holders, bricks, kilns, different forms of decorative wares among others (plates 30 - 35) [6], [22], [32], [33]. Pottery wares in Southwestern Nigeria perform several functions for decorative, utilitarian, industrial, social, ceremonial and religious purposes.



Plate 30
Varieties of traditional pots displayed for sale
at Ijaye Market in Abeokuta
Photograph by Segun Abiodun



Plate 31
Terracotta Water pot with filter
produced by Atamora Pottery
Centre, Atamora, Ikire
Photograph by Segun Abiodun



Plate 32
A o merin joba produced
by Segun Abiodun
at LAUTECH, Ogbomosho
Photograph by Segun Abiodun



Plate 33

Incised and relief terracotta
flower pots produced by Dapo
Art Gallery, Oyo
Photograph by Segun Abiodun



Plate 34

Painted terracotta flower pots
produced by Atamora Pottery
Centre, Atamora, Ikire
Photograph by Segun Abiodun



Plate 35

Glazed casseroles and cup produced
by Dapo Eyinade at LAUTECH,
Ogbomosho
Photograph by Segun Abiodun

VI. CONCLUSION

Significantly, the study contributed to knowledge in elemental analysis and studio art evaluation of clay samples of Southwestern Nigeria. It gives technical information on clays of Southwestern Nigeria which is hoped to help the practicing and potential potters, ceramists and other stakeholders in prospecting for suitable clay(s) for various purposes. Moreover, the study has opened avenue for in-depth and multi-disciplinary research collaborations by clay users in Southwestern Nigeria and Nigeria in general. The study recommends acquisition of basic knowledge in material science which will enable potters and ceramists to understand their material beyond empirical understanding for effective pottery production. Potters especially Ceramics Researchers Association of Nigeria (CeRAN) and Craft and Potters Association of Nigeria (CPAN) with various concerned governmental and non-governmental agencies should solely and jointly engaged in thorough examination of chemical and physical potentialities of various clay samples across the country; thus making the data available for clay users and prospective entrepreneurs in the clay industry for effective pottery and ceramic production.

REFERENCES

- [1] D. Rhodes, *Clay and Glazes for the Potters*. USA: Martino Fine Books, 2015.
- [2] A. K. Fatunsin, *Yoruba Pottery*. Lagos, National Commission for Museum and Monuments, Nigeria, 1992.
- [3] R. O. Rom, Kalilu, M. Akintonde, and O. Ayodele, *Ceramics: Art and Technology in the 21st Century South Western Nigeria*. Agege, Nigeria: Pemilter, 2006
- [4] M. A. Akintonde, S. O. Abiodun and T. E. Akinde, Clay, clay bodies and strength: The example of South-Western Nigeria. *Academic Research International*, 5(3): 280 – 291, 2014
- [5] S. O. Abiodun, Effects of chemical and physical properties of clays of Southwestern Nigeria on pottery and potters, unpublished Ph.D Thesis, Department of Fine and Applied Arts. Ogbomosho: Ladake Akintola University of Technology, 2018
- [6] S. O. Abiodun, Technical trends of cottage ceramic industries in Southwestern Nigeria. *Journal of Visual Art & Design*, Vol. 10, No. 2, pp. 119-14, 2018, DOI: 10.5614/j.vad.2018.10.2.3.
- [7] S. O. Abiodun, M. A. Akintonde, and T. E. Akinde, Small Scale Ceramic Industry in Oyo State: Challenges and Prospects. *Journal of Economics and Sustainable Development*, 4(11), 103-11, 2013.
- [8] S. Peterson, *Working with Clay: An Introduction*. London: Laurence King, 1998.
- [9] R. Fournier, *Illustrated Dictionary of Practical Pottery*, 4th ed. Iola, Wisconsin: Krause Publications, 2000.

- [10] G. N. Ojie and S. Esosuakpo, Physical and chemical test of emonu clay for suitability in ceramic production. Ashakwu: Journal of Ceramics. 5: 96 – 103, 2008.
- [11] I. Effiom, Effect of constituents of clays in the manufacture of ceramics: Chemical analysis of samples from Akwa Ibom and Cross River States in Nigeria CPAN Journal of Ceramics, 2 & 3: 23-29, 2009.
- [12] E. K. Alege and T. S. Alege, Selected Clays of the Bida and Anambra Basins of Nigeria: Their Characteristics, Fired Properties and Ceramic-Suitability. *International Journal of Science and Technology*, 2(7): 560-567, 2013.
- [13] O. A. Ehinola, M. A. Oladunjoye, and T. O. Gbadamosi, “Chemical composition, Geophysical Mapping and Reserve Estimation of Clay Deposit From parts of Southwestern Nigeria”. *Journal of Geology and Mining Research*, 3: 57-66, 2009.
- [14] O. S. Fakolujo, O. S. Olokode, P. O. Aiyedun, Y. T. Oyeleke, B. U. Anyanwu and W. E. Lee, Studies on the Five (5) Selected Clays in Abeokuta, Nigeria. *The Pacific Journal of Science and Technology*, 13(1): 83-90, 2012.
- [15] O. S. Olokode, P. O. Aiyedun, S. I. Kuye, N. O. Adekunle, and W. E. Lee, Evaluation of a clay mineral deposit in Abeokuta, South-West Nigeria, *Journal of Natural Sciences, Engineering and Technology*, 9(1): 132-136, 2010.
- [16] J. A. Adegoke, B. Ogunsile and O. A. Adekunle, “Variation of Thermophysical Properties of Clay with Adsorption Optimization”. *The Pacific Journal of Science and Technology*, 11(2): 639- 648, 2010.
- [17] M. Cardew, “Pottery Techniques in Nigeria”. In S. Leith-Ross (ed.) *Nigerian Pottery*, University Press, Ibadan, Nigeria, 9-13, 1970.
- [18] C. O. Adepegba, *Nigerian Art: Its Traditional and Modern Tendencies*. Ibadan:Jodad Publishers, 7, 1995.
- [19] P. Oyelola, *Nigerian Artistry*. Mosuro Publisher, Ibadan, 2010.
- [20] S. O Abiodun and M.A Akintonde, Physicochemical Analyses of Selected Clays in Southwestern Nigeria and Their Suitability for Ceramic Production. *International Journal of Progressive Sciences and Technologies (IJPSAT)*, 30(1), 636-647, (DIO: <http://dx.dio.org/10.52155/ijpsat.v30.1.3945>), 2021.
- [21] T. E. Akinde, Cobclay Test Viability and Introduction as Clay Body. *International Journal of Progressive Sciences and Technologies (IJPSAT)*, 30(1), 582-602, 2021.
- [22] S. O. Abiodun, *Development of Small Scale Ceramic Industries in Oyo State*, Unpublished M.Tech Thesis, Department of Fine Applied Arts, LAUTECH, Ogbomoso, 2011.
- [23] S. O. Abiodun, *Influence of Islam on Contemporary Pottery in Ilorin*, Unpublished B.Tech Thesis, Department of Fine Applied Arts, LAUTECH, Ogbomoso, 2005.
- [24] S. O. Abiodun, Development and Prospects of Pottery Industry in Ilorin, Nigeria. *International Journal of African Culture and Ideas*, 17(1-2), 81 – 100, 2019.
- [25] S. O. Abiodun and T. E Akinde, Transfer as an Alternative to Direct Drawing in Yoruba Hand Built Pottery. *International Journal of African Culture and Ideas*, 14(1-2), 69 – 186, 2014.
- [26] C. C. Chukueggu, *Contemporary Nigerian Art: And Iis Classification*. DELSU Consult Publishing House, Abraka, Nigeria, 187-189, 1998.
- [27] P. Layiwola, Benin 1897.com: Art and the Restitution Question: An Art Exhibition of Installations and Sculptures in Layiwola, P. and Olorunyomi S. (ed) *Benin 1897.com: Art and the Restitution Question*. Ibadan: Wy Art, 154, 2010.
- [28] T. E. Akinde and S. O. Abiodun, Adaptive Possibilities of Decal in Nigeria Ceramic Art. *AfricanJournal of Contemporary Issues*, Vol. 17(1-2), 97 – 118, 2019.
- [29] T. E. Akinde, Wares Firing in September: Defying Odds. *Eyo: Journal of the Arts and Humanities*. 3(1), 237-247, 2017.
- [30] T. E. Akinde, Individual Fired Brick Production in Nigeria. *Journal of Visual Art and Design*, 9(1), 49-63, 2017.
- [31] O. J. Ohimai, I. B. Kashim, and T. L. Akinbogun, Development of a Prototype Pots and Potsherds Kilns for Facilitating Ceramic Wares Firing in Tertiary Institutions in Nigeria. *Creative Education*, 4(8), 475-483, 2013.

- [32] T. E Akinde, A. O. Odeniyi, and S. O. Abiodun, Glazed Tiles as Floor Finish in Nigeria. *Journal of Arts and Humanities (JAH)*, 2(8), 52-63, 2013.
- [33] S. O. Abiodun and T. E. Akinde, Covid-19 Ceramic Expressions of Ogbomoso Art School. *The Artist Journal: A Journal of Faculty of Environmental Studies, University of Uyo, Nigeria*, 7(1), 96 – 116, 2024.