

# **Technological Innovation of Agidigbo Traditional Musical Instrument: Conceptual and Theoretical Perspectives**

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**Article DOI:** 10.48028/ijprds/ijormsse.v9.i2.23

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## **Abstract**

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**T**his study conceptually and theoretically advocated for technological innovation of Agidigbo traditional musical instrument. This study revealed different types of Agidigbo which range from the smallest (soprano), medium size (alto or tenor) and the large (bass). The Agidigbo had four sides, a pair each of the same length and breadth, which made it a rectangular-like box. The study also showed that Agidigbo has a soundboard with a perforated sound hole, and a base. The applications of theories provide comprehensive understanding of design mechanisms of Agidigbo. Many materials, tools and methods aimed at better structuring and optimizing the innovation processes. Once the designer imagines something new concepts – expanding the C-space and activates simultaneously new knowledge – expanding the K-space. These expansions are complementary. A new knowledge provokes the identification of new concepts and elaboration of new concepts results in the search process to acquire new knowledge. The study therefore recommended that conservation materials for Agidigbo musical instruments should be assessed before application to evaluate their impact on sound as they may significantly affect the acoustic properties of musical instruments and thus alter both their tangible and intangible identity.

**Keywords:** *Agidigbo, Conceptual perspective, Technological innovation, Theoretical perspectives, Traditional musical instrument*

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### **Background to the Study**

In recent times, traditional musical instruments are not spun out in the technology use in-line with today's technology advancement. A number of Nigerian musicians nowadays have innovated traditional musical instruments using modern technology which can be described as robotic musical instruments (Kenechukwu, 2020). Robotic musical instruments are either use to make more interesting music performance and to build an everlasting crew that can play with musical artists (Kapur, 2005; Annuar, 2021). Generally, the innovation is often centered on modern or western musical instruments but hardly ever on traditional instruments (Leng, Norowi & Jantan, 2018) and a large number have thrived in performing the innovation instruments (Damkliang, Thongnuan & Chanlert, 2012). For that reason, the call for technological innovation in Nigeria traditional musical instruments is indispensable which can unite the past with the future, create more opportunities to showcase them on the international level and for the purpose of education. Though, there are conventional musical instruments that are used together with technology, but nearly all of them use a virtual application that uses the least cost. Several studies demonstrate that the use of such technology as an instructive approach has positive attitude on user's understanding, interest and knowledge of traditional musical instruments (Simeon, 2015; Wiguna, 2019; Annuar, 2021).

Musical instruments and their construction, acoustic properties, classification, history, and broader cultural context varies from one part of the world to another, even ethnic groups are used as authentic media for interaction in various situations such as societal work, worship, recreation and pattern of cultural expressions such as folk tale, dances and plays to mention a few. Vidal (2012) opined that urgent scholarly intervention to document nature, functions, technology and performance of traditional musical instruments is now essential. Since technology involves the study, development, application of devices, machines, and techniques for manufacturing and productive process, creativity and modernization of existing musical instruments became a welcome idea. This study focuses on the traditional Agidigbo musical instrument in the South Western Nigeria. It is worthy of note that we have hundreds of languages spoken in Africa, one instrument can have as many as ten names. The names Sanza, Mbira, Ubo aka, Ikpa, Mbotu, Agidigbo, Kembe, refer to an instrument known by westerners as kaffir piano, hand piano, thumb piano or finger xylophone (Akpabot, 1986).

The Yoruba are a people predominantly found in the south western geo-cultural zone of Nigeria. The region comprises of six states, namely Oyo, Osun, Ogun, Ondo, Ekiti and Lagos (see Figure 1.1). There are many sub-ethnic groups which make up the Yoruba nation in Nigeria, they include, Ijebu, Ijesa, Ekiti, Egba, Ife and Oyo amongst others. There is no gainsaying that not only are the Yoruba lovers of music, but the art is also an inseparable element of their culture. Yoruba musical performance can be instrumental, vocal, or a combination of both. Among the Yoruba sub- groups, there are various types of Music, each associated with one function or the other. Examples of such music are Senwele, Ijala, Ewi, Sango pipe, Agidigbo, Adamo, Dadakuada, Waka, Fuji and Juju. Just like Dundun, Samba and so forth, Agidigbo is both an instrument and musical genre. As an instrument, agidigbo is structurally constructed as a set of graduated rows of keys

made of metal, mounted on a wooden frame box resonator and played through the means of plucking technique using the index and the middle fingers. At times, the body is also hand beaten to create percussive effect. Agidigbo music is named after the principal instrument of the band – Agidigbo. As a genre of Music, agidigbo is a social/ recreational music that is rooted in aphorism, customs and traditions of the Yoruba people. The meaning inherent in the message of the song and the instrument requires deep understanding of Yoruba language. The Agidigbo is played like Piano, the player maintains concordance with rhythm while the player sings the song with the instrument.



**Figure 1:** Map of South Western geo-cultural zone of Nigeria

The music of Nigeria includes many kinds of folk and popular music, some of which are known worldwide. Styles of folk music are related to the multitudes of ethnic groups in the country, each with their own techniques and instruments. Yoruba has a very rich culture and are seen as custodian of 'virtue as a culture' and one the world can benefit from. Talking about Music, Yoruba takes a certain lead ranging from highlife, Juju, Were, Fuji, Apala to mention a few. According to Omojola (2012) the music of the Yoruba people is perhaps best known for an extremely advanced drumming tradition. Within each drum family there are different sizes and roles; the lead drum in each family is called *Ìyá* or *Ìyá Ìlù*, which means "Mother drum", while the supporting drums are termed *Omele*. Yoruba drumming exemplifies West-African cross-rhythms and is considered to be one of the most advanced drumming traditions in the world. Generally, improvisation is restricted to master drummers. Some other instruments found in Yoruba music include, but are not limited to; The Gojé (violin), Shèkèrè (gourd rattle), Agidigbo (thumb piano that takes the shape of a plucked Lamellophone), *Saworo* (metal rattles for the arm and ankles, also used on the rim of the bata drum), *Fèrè* (whistles), *Aro* (Cymbal), Agogô (bell) different types of flutes include the *Ekutu*, *Okinkin* and *Igba*.

Agidigbo also regarded as metamorphic piano among the Yoruba has its unique features and sound production. The instrument is regarded as a weird Western-Nigeria ancient drum. The tunes are in proverbs and can only be interpreted by the wise. It is also worthy of note that admit every drum makes a resemblance of speech or talk in Yoruba laid from the deep vibrating sound of magnetic gbedu drum to the slapping sound of bata. Despite the accession of Euba (1969) which defining traditional music, he stated that the type of Music which is created entirely from traditional element and has no stylistic activity with Western music, but the gap is still there filling the gap to step up traditional instrument electronically. The 2018 annual Agidigbo Musical festival in Badagry, Lagos State was spiced up with other instrumental ensemble like trumpets. According to Samuel Dagbeyon (2005), the organizer of music festival in Badagry that Agidigbo music is unique at it has its own instrument which is used to play it, and it is complemented with trumpet and side drums which make the and product sound great indigenous at technology of Yoruba in what the instrument maker do employ. This is tight a special skill and by long practice, according to special procedure, principles and norms governing the art in Yoruba culture (Vidal, 1991). Nketia (2014) submitted that the concept of technology in return to musical instrument ought to involve a robust investigation in the design of the instrument and craftsmanship material and construction as well as function in order to facilitate expansion in the study of indigenous instrument. However, the fabrication of an acoustic instrument as a wireless traditional musical instrument reproduction is not without compromise: acoustic instruments are non-linear systems, and their imperfections and opportunities for exploitation are most often what lends the instruments their 'character' or 'expressivity' (although 'expression' is a fraught term in digital musical instrument (DMI) research (Gurevich & Treviño, 2007). An often-quoted example of an unexpected flaw being appropriated as an artistic tool is Jimi Hendrix's use of feedback in his electric guitar performances. How to achieve this same level of 'character' in wireless traditional musical instruments is a difficult question: it is a relatively trivial task to design an innovative wireless Agidigbo that makes like sounds in a way that is more physically accessible than a traditional Agidigbo - it is a different question altogether to make that instrument as engaging as a wireless musical instrument to both the performer and the audience.

As Bates (2012) points out, instruments are not simply passive noise-producing tools, but possess a socio-cultural load that is at least as equally worthy of consideration as the technical details of the way they can be played. In this research, the researcher aims to further explore this innovative production of traditional musical instruments, and in particular whether or not attempting to harness the pre-existing cultural associations of traditional instruments may provide greater access to existing musical cultures for musicians. This research is to widen understanding about the Agidigbo traditional musical instrument in the performance contexts of conceptual and theoretical perspectives and to provide a pathway towards more and better innovative traditional musical instrument blueprint.

### **Technological Innovation and Agidigbo Traditional Musical Instruments: Conceptual Perspective**

Innovation is the practical implantation of ideas that result in the introduction of new goods and services or improvement in offering goods or services (Adeyeye, 2018). Innovation is more apt to involve the practical implementation of an invention (i.e., new/improved ability) to make a meaningful impact in a market or society and not all innovations require a new invention. Furthermore, surveys of the literature can innovation have found a large variety of definitions in different books by different authors as stated earlier. Adeyeye (2018) attempted to give a multidisciplinary definition and arrived at the following definitions. Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their market place. The word technology is a Greek language which means 'Techno' meaning "art and craft", with logos "word speech", meant in Greece, a discourse on the arts both fine and applied. In the narrow sense, technology refers to the industrial processes that succeeded craft operations (Ajiboye & Akere, 2019). In the broader sense it refers to all process dealing with materials. Technology in respect to science is defined according to advanced learner's dictionary (2000) as a scientific knowledge used in practical ways in industry. Adeleke (2012) opines that technology helps to make people to be more productive and freer to explore. Ajiboye and Akere (2019) state that technology in a way has penetrated into music science and thus bringing us to defining the term music technology as the act of applying scientific and engineering materials to satisfy human basic need of music entertainment. Music technology is the production and creation of sound through scientific or technological devices (for music production in the musical studio and musical video recording) as well as having to do with the construction of musical instruments and the basic principles guiding it. One important aspect of music technology is musical instrument.

Musical instrument is the branch of music technology that deals with the production, repair, fabrication or construction and maintenance of musical instruments as well as bringing us to the knowledge of the instrument's family (Ajiboye & Akere 2019). This branch also deals with the basic principles guiding the construction of any musical instrument. Nigeria, like other Africa countries, has a wide variety of traditional musical instruments. Nigeria has a rich heritage of traditional instruments although for a long time, the impression created by early travelers was that drums were the predominant musical instruments (Inanga & Soyanno 1991). While it is true that drumming plays an important role in Nigerian music. The Nigerian indigenous instruments perform musical, communicative and religious purposes. These include announcements, directing performers or dancers on the next step to take, for religious worship, as accompaniments to singing groups, for orchestral indigenous music, as solo instruments, as rhythmic instruments that play regular time patterns as metronome giving ostinato effects. Ofuani (2011) states that some Nigerian musical instruments that are prevalent in the workshop-market are: xylophone (the double-slab and multislab types), wooden bells ('okpokolo' slit drums (ekwe/ikoro), metal bells (alo, ogene etc.), 'mgbiligba'(bell), ogenephone, wooden rattles, calabash/gourd rattles, basket rattles, musical pots (the

foam-pad and the hand beaten types), varieties of membrane drums ('igba') bongo, ogwe etc.), thumb-piano, the Igbo people's wooden flute ('oja').

There are various legends and myths about the origin of musical instruments among ethnic groups. In the Yoruba ethnic group, musical origin center around a personality named Aryan. He taught the Yoruba families the art of drumming. The Ijaw of the Rivers State have musical instruments associated with their mermaid dances. They believe humans did not invent the instruments, but they were copied by ancestors who spied on the gods, goddesses, and mermaid of the sea (Natasha, 2012). Musical instruments play an important role in the lives of Nigerians. Singing and dancing accompanies the musical instruments at social festivities such as weddings and funerals. Traditional musical instruments announce the opening of a war or festival. They may also accompany the arrival and departure of a visitor to and from a royal palace. Musical instruments also play an important role in religious ceremonies. An important aspect of traditional instruments is that they should be played so they reproduce the tonal sounds of the player's tongue. A musician is evaluated on how poetic his playing is rather than the melody or rhythm. Traditional musical instruments give more happiness than the human voice alone. When musical instruments are played, they appeal to the eye. Elaborate decorations may be made on the musical instruments. Many of them have symbolic figures on them or gods.

Generally, Nigeria traditional musical instruments can be categorized into four main divisions; chordophones, membranophones, idiophones and aerophones (Natasha, 2012; Onwuekwe, 2011; Okpara 2016). The first category of traditional Nigerian musical instruments is the Chordophones. Chordophones are often referred to as string instruments. They make a sound through a vibration of a cord or a string. The string may be of fiber, hair, twisted skin, or metal wire. Friction, striking, or plucking may make the sound. The sound is usually very quiet so usually a resonator is needed. A resonator is often made out of wood or calabash. The sound depends on the string length, degree of tension, and the weight of the string. Chordophones are often referred to as melody instruments and are common in Nigeria, especially in the north. If the strings are vertical, the instrument is called a harp. If the strings are plucked, the instrument is called a lute. If a bow is used across the chordophone, it is called a violin or a bowed lute. Chordophones are instruments made of strings or cords and are played by plucking e.g., Hausa violins such as 'goje', 'gurmi' and Igbo zither (ubo akwara).

Membranophones are instruments, which make sounds by striking with the hands, stick, or leather thongs. A membrane material is stretched over a frame and it is attached through pegs or hide strips (Natasha, 2012). Skin drums are called membranophones because sound is produced from them by the vibration of stretched membrane. Drums are the most common membranophones and they are the most popular instruments in Nigeria. Sizes of drums vary from very small ones to ones that reach 12 feet. Shapes vary from cylindrical, barrel like, and even hourglass. Wood is the most common material used for the frame, but pottery and gourds are also used. Some drums are covered on one end while others are covered on both ends. The position of playing drums depends on

size and shape. Some of the drums are placed on the ground, on a stand, between the knees, or slung over the shoulder of the player. The talking drum is the most famous in Nigeria. This is well known among the Yorubas and Ibos. It is named the talking drum because it is to be used to imitate speech and send messages, which recite history and sing, to the chiefs. Drums are classified as membranophones because their sound is produced by vibrating a membrane (Microsoft Encarta, 2007). It consists of a skin tied over the top and pierced by a stick. Examples are conga drum, talking drum, tambourine etc. Conga drum is a long, narrow drum played with the palm of the hand and fingers. Tambourine is a small frame drum that is constructed of a single membrane stretched over a circular rim, which usually has metal jingle disks attached to it. It can be played in three different ways: tapping the membrane with fingers, shaking the instrument, or striking it against the body. Nwafor, (2010) states that membranophones are instruments that use leather or membrane covering at one or two drum-heads.

Idiophones are instruments, which are capable of making sounds by themselves when they are hit or shaken. Balls, rattles, xylophones, and sansas are examples. Wood, metal, calabash, and bamboo are commonly used to make idiophones. Shapes and sizes vary from place to place. These instruments are mainly used for background sounds. Leg rattles are often used by dancer to provide music to dance to. Idiophones are resonating percussion instruments made from resonating material that does not have to be tuned e.g., gong, xylophone (Microsoft Encarta, 2007). The slit drum found in tribal cultures is also an idiophone. Idiophones are the instruments that produce sound by the vibration of the entire bodies (Nwafor 2010). It is made of a tree trunk hollowed out through a narrow stick. The bell is a musical percussion instrument, a hollow cup-shaped vessel, usually made of metal but sometimes made of wood, pottery (pot drum), or other material that produces sound. Pot gong (drum) is made of bronze. The simplest ensembles have four or five pot gongs tuned to different pitches. Xylophones come from the Greek word xylon (wood), phone (sound). It is a musical percussion instrument consisting of a series of graduated wooden bars that are struck with mallets, to provide sound. Shaken idiophones are instruments that are shaken. An example is rattle or maracas. Idiophones are played by hitting, shaking or plucking. Examples are: struck idiophones (e.g., pot drum (udu), slit-wooden drum (ekwe), bells or wooden gong (ogene), xylophone (ngedegwu); shaken idiophones (the rattle) and plucked idiophones ('ubo' aka (thumb piano)).

Acrophones are often referred to as wind instruments because the sound is made by air. The most common acrophone is the flute. The player blows air through one end of the acrophone and the air passes through the end creating a sound. The longer the flute, the lower the sound it will produce. Some flutes have holes so the sounds can be manipulated by covering the holes. Trumpets are also acrophones and are usually end blown. Trumpets are made of joined sections of calabash, bamboo, or metal. An oboe is also an acrophone and sound is made as vibrations go across a reed. Aerophones are available traditional instruments that consist of flutes, horns and trumpets. These instruments are played by blowing air into them e.g., local flute (oja), Hausa reed (aligaita), Hausa trumpet (khakaki). They produce sounds by the vibration of the air column (Onwuekwe, 2011).

### *Traditional Agidigbo Musical Instrument*

The Agidigbo or “Molo” is a large traditional plucked Lamellophone (thumb Piano) found in the South Western Nigeria to perform apala music. It is a box, big enough to sit on musician's lap, with 5 to 6 strips of metal set side by side on top like keys on a piano keyboard. The tongues are designed to vibrate. The musicians use his fingers to pluck them, the left hand plucking two or three rhythmic tongues (metals), the right hand plucking the three to four melodic tongues. Some virtuosos use as many fingers as they like. Players also tap the side of the instrument with a thick ring, or the top with their thumbs or knuckles. The instruments produce sonorous tones. Because of the Yoruba language's nature as a fond language, the Agidigbo can act as a musical “speech surrogate”, conveying language through its tones. As noted by Omojola (2006), Agidigbo (thumb piano) formed one of the instrumentations of a typical apala ensemble, but how is this instrument built, not to talk about modernization. He also asserted that agidigbo represented the Yoruba example of the folkloric band and also referred to another syncretic idiom, which gained popularity in Western Nigeria even in the late 1940's it was also recorded by Omojola (2006) that the emergence of agidigbo music, pioneered the development that would lead to the full emergence of highlife which at its time produces local variants of the western guitar.

The tuning of the agidigbo is not consistent, this according to Akpabot (1998), but usually tuning it in thirds to the left and right from the tonic notes situated at the center. He acknowledges the instrument as one of Africa's most popular instruments, but it is worthy of note that the Agidigbo as an instrument is gradually going into extension, but the name now been implied as a type of music now been implied as a type of music forgetting that the musical style called Agidigbo got its name from the principal instrument in the ensemble. Olubiyi (2019) opined that slavering the instruments that teaching morals should not be brushed away, but re explained in tertiary institutions of learning. This will increase moral and teach the younger generation the way we are thought too. The Agidigbo consists of five and at times six metal tongues mounted onto the top of a box, approximately 2ft X 2.5ft and an inch high. The tongues are bent inward to allow them to resonate. They are divided into a set of two and a set of three. The two are for rhythm, the three have a high, middle and low note for melody. Each set is played with a different hand, and so the fingers may be used. A tick ring in a hand can also be used to drum on the instrument's wooden side, and the thumb to drum the top. The Agidigbo is either played setting the instruments on the musician's lap or suspended at waist level from a rope worn round the neck of the player.

Tuning of Agidigbo is relative to the other tongues. The three melodic tongues are set with a second or third between adjacent tongues, with no more than a fifth between lowest and highest notes. The rhythmic tongues have a high and low tone, compared to one another, but are not specifically tune Tongues are placed from left to right.

1. Omele ako (lower rhythmic)
2. Omele abo (Higher rhythmic)
3. Iya Ilu (Low melodic note)



4. Adamo (Middle melodic note)
5. Asaju (Higher melodic Note)

In Nigerian tonal language such as Yoruba, instruments whose tone can be controlled, can be played to stimulate speech. Such speech – surrogate instruments include the Goge fiddle in sakara music, the *iya ilu* talking drum in Yoruba genres, and the Agidigbo (thumb piano) in Apala music. It should be noted that, Yoruba words are made of high, middle and low tones. Because the tones are important to meaning, they affect the melody. Yoruba musicians are able to combine phonemic tones into intelligible speech using additional tools such as “Konkolo rhythm” to add connotation. The rhythm permeates Yoruba and other sub-saharan African music, hence, musician can “encode” words into the music by building phonemes of high mid and low tones. The instrument was used for indigenous music into the 1970s. As new forms of popular music emerged, musician adapted it. The instruments and its tonal qualities enrich Apala music. The instrument is most popular in the Ibadan and Ijebu areas of Yoruba land in the south western Nigeria. It may accompany a *sekere*, or an apala band. Popular players included, Ebenezer Obey, Haruna Ishola, Adeolu Akinsanya to mention a few.

#### **The Tradition and Ethnography of Agidigbo**

The Yoruba music has a drumming tradition with characteristic use of the Agidigbo and *dundun* hourglass tension drum. The agidigbo are mostly used by the Apala musician. The ensembles using the *dundun*, play a type of music that is also called *dundun*. These ensembles consist of various sizes of tension drums, along with kettle drums (*gudugudu*) and Agidigbo. The leader of a *dundun* ensemble is the *iya ilu*, who uses the drum to talk by imitating the tonality of Yoruba. Much of Yoruba music are spiritual in nature and are devoted to the gods. Yoruba music has become the most important component of modern Nigerian popular music, as a result of its early influence from European, Islamic and Brazilian forms. These influences stemmed from the importation of brass instruments, sheet music, Islamic percussion a style brought by Brazilian merchants. In both the Nigerian's most populaced city, Lagos and the largest city of Ibadan, these multicultural traditions were brought together and became the root of Nigeria music. Modern styles such as Ayinde Barrister's Fuji, Salawa Abeni's *waka*, and Sina Peter (Juju) are derived primarily from Yoruba traditional music. Yoruba music of south western Nigeria has now come of age and the new generation of Nigerian music now sing in their native language. Dice is one of many that broke into the industry will Gonge aso and many more artist followed. UK based saxophonist Tunday Akintan created yoruba at based on Yoruba rhythms. According to Omojola (1995) in his book Nigerian Art music, said the agidigbo player wears a thick ring on his thumb which he uses to tap the side of the wooden box. The lyrics using by the musician are largely folkloric and entertainment. It should be noted that for a long time, Nigerian traditional music was such as a fixed and rigid, while the popular was allowed headroom for innovations, motions that continue to be challenged by current one.

### Physics of Agidigbo Musical Instrument

According to Beckham (1965), the physics of the piano stated that musical instrument create sound by vibrating at a frequency within the range of human hearing. It should be noted that different types of instruments have different vibrating parts, and this destination has long been used to categories musical instruments. For example, Agidigbo (thumb piano) have vibrating strings membrane between the ring and the metal parts when pluck by the player. Another example is that aerophones like flute and pipe organ have vibrating columns of air and in idiophones like bells and triangles, the whole instrument vibrates. The precise frequencies of sound created by a musical instrument are largely determined by the physical properties of that instrument. For example, the pitch of Agidigbo (thumb piano) is a function of the mass, shape, size and tension, also the pitch of guitar is determined by the length, mass and tension of the string. Hence, when a musician tunes a musical instrument, they are altering the instruments physical properties to obtain the desired pitch. The relationship between a musical instrument's physical properties and its sound frequencies raises an interesting prospect: Could an instrument's sound be used to infer information about the instrument's physical properties? The agidigbo consist of metal tongues of different sizes and length attached to a wooden sounding box, these tongues are plucked to creates a musical note. Asidiophone the Agidigbo's sound is influenced by the physical properties of the metal tongues: longer or larger tongues create low notes and shorter or smaller tongues create high notes. Mathematically in general the frequency  $F_n$  of a plucked Agidigbo tongues is

$$F_n = \frac{n^2 \sqrt{EI}}{2l^2 \rho A}$$

Where  $n$  is the mode of vibration  
( $n = 1, 2, 3, \dots$ )

( $n$ ) - are eigenvalue solution of the frequency equation of a cantilever beam constant and the remaining variables are known properties of the tongues.

$E$  - is the young's modulus of the tongue's materials

$I$  - is the second moment of the inertial

$\rho$  - is the density of the tongue materials

$A$  - is the cross-sectional area of the tongue

$l$  - is the length of the tongue

Apparently, from the equation above, it shows that at least five different physical properties of the Agidigbo tongue influence the pitch of an Agidigbo note and could therefore in principle be measured by analyzing the frequency of an agidigbo note.

### Agidigbo - String and Percussion Instruments

Throughout history various methods of musical instrument classification have been used. Based on our study Agidigbo, it is not clear whether it should be classified as a string instrument or a percussion instrument. For this reason, it might be said that with these extra categories, the classical system of an instrument classification focuses on the

fundamental way in which instrument produce sound, and more on the technique required to play them. Thumb piano are percussion instruments.

### **Contemporary Music of Agidigbo**

In an interview with Dabi (2014), Agidigbo from Nigeria, a renowned talking drummer sees Agidigbo as a wooden box with metal tongues, played by plucking the metal with fingers and simultaneously tapping the sides of the wooden box. However, the lyrics song by musicians are largely folkloric. In the 1970s, Agidigbo music used to attract crowds, who would set and drink palm wine in the evenings. Despite its waning popularity, the music genre still thrives through the annual Agidigbo musical festival in badagry, Lagos state. According to Dagbeyon (2013), organizer of the contemporary music and entertainment in Badagry, it can be traced back to the late 80s when brass band was popular and the agidigbo music festival was celebrated to show case that-“Agidigbo music is unique as it has its own instrument which is used to play it and it is complimented with trumpets and side drums which makes the end product sound great”. Dabi (2014) opined that “This is another percussion instrument from Nigeria serving the Yoruba people musically”. Research reveals that oral interviews and bibliographical evidence were used to elicit information, content analysis was used to process the musical and tonal data generated in the Agidigbo music. According to Babalola (2016), He opined that musical instrument reflected a class -oriented use that was concomitant with the stratified serial structure of the western world. This music is used as commercial dance music and combines vocals with musical instrument. Our musical instrument like Agidigbo have touch the Yoruba people in the musical world and create limelight! Most of the musicians in the south western Nigeria that making melody of juju, apala etc are making use of agidigbo in a well automated manner. According to Adeyeye (2017), opined that innovation in music cannot be over emphasized. As technology still developing, things change with time our musical instruments like agidigbo also fabricate in an annotated ways in order to meet the needs of the musician of this age and the public in general. Olatunji (1965) opined that musical instrument of this age is to be automated for the modernizing of our heritage from our forefather.

An old musical instrument like agidigbo needs to meet the needs of this age. Olupemi (2017) submitted that music tonal communication decoding and conserving the agidigbo instrument in apala music needed to be enhanced. He opined that the agidigbo is a major melo-rhythmic instrument for the apala music, used by Yoruba musicians to achieve speech surrogate due to the tonal inflection of the Yoruba language. However, he stressed that, it is somewhat easier in Yoruba vocal music to employ the three phonemic tones low, mid and high tone for word intelligibility, the musicians most however adapt these tones in playing the melo - rhythmic instrument (Agidigbo) for adequate communication. The journal on international society for music education opined that apala music in western Nigerian typically incorporates pitched-up vocal sung in the Yoruba language, alongside Agidigbo, a thumb piano and layered percussion. Agidigbo have changes the musical world. It needs to be upgraded to the modern-day musical instrument so as to preserved our cultural musical heritage. Basically folkloric in form and delivery, Agidigbo usually preaches goodness, love and peace. It is accompanied by sekere, maracas, tambourine,

and drums. The late Fatai Rolling Dollars was an Agidigbo maestro but was well known for the guitar. Also, at times, the agidigbo player or singer passes a subtle shot at someone who could not decipher the coded language of the music.

### **Technology and Traditional Agidigbo Musical Instrument**

A survey by the News Agency of Nigeria (NAN) examines the impact of technology on Nigerian musical instruments in which Agidigbo is one of them. Yoruba traditional artistes ultimately rely on percussion instruments like Agidigbo for the uniqueness of their works. This is because this musical instrument elicits the innate ability of the artistes to control and provide a diverse way of tempo, sound and pitch in their songs. But with the advent of technology and its introduction to the production of music, analysts believed that traditional music genres have been affected by various modern technologies. Although music scholars have commented based on interview, the positive impact of technology in the music industry, they note that traditional musical instruments are fast disappearing and effort should be made to preserve them. Another school of thought said that old Agidigbo must be modernized to suit the taste of modern genre through the application of technologies in order to preserve it. Nowadays many potential musicians no longer have to procure musical instruments before they can record or play music. Any potential musician can easily browse from various applications on the internet to listen to tunes suitable to the music they want to compose. However, it should be noted that technology had adversely affected culture and tradition, including morality in society especially among the youth. The youth now, with the advent of technology, interact with some weird foreign culture and adopt some as their lifestyle. Olupemi (2017) opined that most Nigerian local musicians have not been opportune to attract awards because they have not taken time to explore our local musical instrument with their music to meet the needs of this age. He said the use of these local instruments in a modern way would add unique features to their music rather than opting for computer-generated sounds. According to Olupemi (2017), technological advancement has to present positive effect in Nigeria indigenous music and 60 percent negative effect he cancelled. However, urged Yoruba musician and Nigerian in general to explore local instruments such as kakaki, goje, agidigbo, gangan, gudugudu and many others peculiar with each ethnic group. He said this will make their music distinct from all other music as they stay creative in their choice of career.

Music instruments are set into vibrational motion at their natural frequency when a person hits, strikes, strums, pluck or somehow disturbs the object. Each natural frequency of the object is associated with one of the many standing wave patterns by which that object could vibrate. The natural frequencies of a musical instrument are sometimes referred to as the harmonics of the instrument. However, it should be noted that an instrument like Agidigbo (thumb piano) can be forced into vibration at one of its standing wave patterns, if another interconnected object pushes it with one of those frequencies. This is known as resonance – when one object vibrating at the same natural frequency of a second object into vibrational motion.

## **Technological Innovation and Agidigbo Traditional Musical Instruments: Theoretical Perspective**

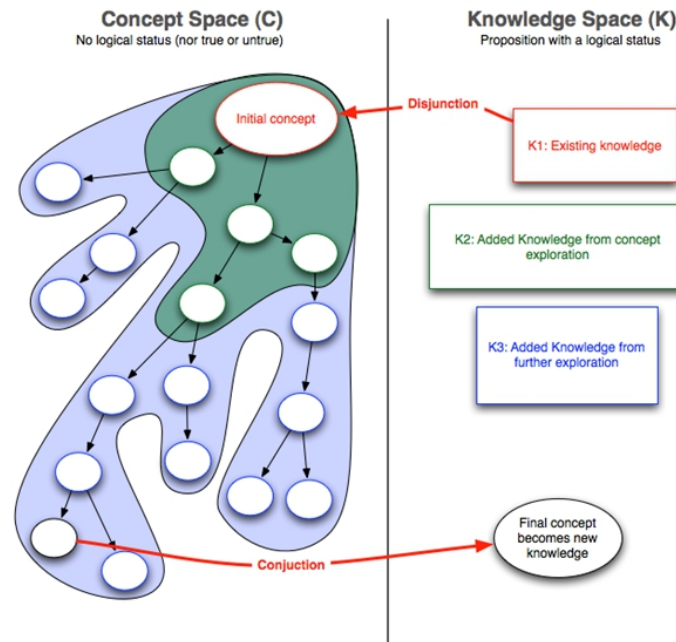
This study is based on two theories which are: C-K theory of innovative design and music theory of continuity and change.

### **C-K Theory of Innovative Design**

The study adapts the C-K theory of innovative design propounded by Armand Hatchuel (2009), explains invention, creation, and discovery within the same framework and as design processes. Innovations and inventions were considered for a long time as a mysterious phenomenon. In the 90's, Armand Hatchuel, Benoît Weil and their research team discovered that these activities could be explained and modeled; they named them "innovative design". C-K innovative design theory is also known as concept-knowledge theory which was developed within the Engineering Design curriculum at Mines ParisTech, Centre for Management Science. C-K theory describes and explains the reasoning of a designer as he thinks of and designs a new object – a new product, service, or process. In addition to its explanatory power, this theoretical framework provides powerful generative mechanisms to overcome cognitive obstacles, thus improving our ability to innovate. C-K design theory or concept-knowledge theory is both a design theory and a theory of reasoning in design. It defines design reasoning as a logic of expansion processes, i.e., a logic that organizes the generation of unknown objects. The theory builds on several traditions of design theory, including systematic design, axiomatic design, creativity theories, general and formal design theories (Braha & Maimon 1998). Claims made for C-K design theory include that it is the first design theory that offers a comprehensive formalization of design that is independent of any design domain or object. The name of the theory is based on its central premises: the distinction between two spaces: a space of concepts C and a space of knowledge K. It is used by designer with its application on management of an innovative field, prospective strategy designing and driving research and knowledge management. The core idea behind C-K theory is to define rigorously a design situation. A brief is an incomplete description of objects that do not exist yet and are still partly unknown (Ozgur, 2004). The first step in C-K theory is to define a brief as a concept, through the introduction of a formal distinction between concept and knowledge spaces; the second step is to characterize the operators that are needed between these two spaces.

The knowledge space is defined as a set of propositions with a logical status, according to the knowledge available to the designer or the group of designers. The knowledge space (i.e., K-Space) describes all objects and truths that are established from the point of view of the designer. Then K-Space is expandable as new truths may appear in it as an effect of the design process. Conversely, the structure and properties of the K-Space have a major influence on the process (Hatchuel & Weil, 2009). A concept is defined as a proposition without a logical status in the K-Space. A central finding of C-K theory is that concepts are the necessary departure point of a design process. Without concepts, design reduces to standard optimization or problem-solving. Concepts assert the existence of an unknown object that presents some properties desired by the designer. Concepts can be partitioned

or included, but not searched nor explored (Hatchuel & Weil, 2009). The following graphical representation summarises the design process using C-K theory.



**Figure 2:** Design process using C-K theory

The application of this theory provides a comprehensive understanding of design mechanisms of Agidigbo. Many materials, tools and methods aimed at better structuring and optimizing the innovation processes. Once the designer imagines something new, he creates new concepts, expanding the C-space and activates simultaneously new knowledge, expanding the K-space. These expansions are complementary. A new knowledge provokes the identification of new concepts and elaboration of new concepts results in the search process to acquire new knowledge.

### Theory of Continuity and Change

Theory of continuity and change propounded and first used by Herskovits and Bascom (1975). The main point the theory is arguing out in the context of this work is that the tradition of our people should continue but with improvement taking the advantage of technology in face-lifting the quality of our end product in terms of construction and this would bring about good change. The theory has also been used by many scholars like Blacking (1978), Alaja-Browne (1989), Adegbite (1992), Okunade (2005) and Samuel (2005). This study explains the dynamism of Agidigbo music using the theory of continuity and change against the background that there are certain frictions responsible for stability and innovation in musical performance in a given culture. Continuity and change as a theory, in relation to music, states that music through various changes in styles, practice, instrumentation, composition but still maintain some element despite the

changes. There are a few bodies of literature on construction of different lamellophone instruments like the Mbira, Kalimba but scarce documentation of the construction of Agidigbo which is specific to Yoruba land of Nigeria. This makes this research work significantly important. The research focuses on the technology behind the wireless construction of the Agidigbo.

### **Conclusion and Recommendations**

In the past, makers have been firmly involved in examining and copying traditional instruments. This tendency only grew stronger with the emergence of the early music revival in the middle of the 21st century, when the demand for electronic and digital musical instrument increased. Although makers thus developed many initiatives, written scientific output documenting their efforts remains scanty, a few exceptions aside. This research has advocated for the innovation of traditional musical instrument makers towards full-fledged design. Musical instrument are fundamental tools of human expression that reveal and reflect historical, technological, social and cultural aspects of times and people. These three-dimensional, polymateric objects, at times considered artworks, other times technical objects, are the most powerful way to communicate emotions and to connect people and communities with the surrounding world. From the review so far made, it is known that Nigerians have a wide variety of traditional musical instruments ranging from chordophones (strings/plucked instruments), membranophones, (instruments that produce sounds by the vibration of stretched membranes), idiophones (self-sounding instruments) and aerophones (indigenous wind instruments). Musical instruments are made in different shapes; therefore, the rectangular box shape of *Agidigbo* has a way of influencing the timbre of the sound produced from the *Agidigbo*. The study found that shape affected the acoustics of *Agidigbo* musical instrument in terms of quality of sound. This study revealed different types of *Agidigbo* which range from the smallest (soprano), medium size (alto or tenor) and the large (bass). Therefore, the study focused on the set comprising of the three sizes which involves the same process as any other size, the difference being the size in the length and breadth, the number of keys, and as well as the sound hole and bridge. The *Agidigbo* had four sides, a pair each of the same length and breadth, which made it a rectangular-like box. The study also showed that *Agidigbo* has a soundboard with a perforated sound hole, and a base. The study therefore that conservation materials for *Agidigbo* musical instruments should be assessed before application to evaluate their impact on sound as they may significantly affect the acoustic properties of musical instruments and thus alter both their tangible and intangible identity.

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