Construction of a Diatonic Woodblock Using Modern Tools

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Abstract

Music technology has advanced with the use of modern tools in constructing woodblock instruments in a small rectangular shape. Woodblocks have been in existence for some years and have not been constructed in seven-tones (diatonic). I have watch a video performance where three tone woodblocks were played, but cannot play a full music. The objective of this paper is to use modern tools in constructing series of woodblocks to play diatonic scale. In-depth interviews were embarked on with woodworkers, wood machinery technicians, and sawmill dealers from different parts of Delta State, Nigeria. These interviews were recorded on video tapes alongside pictures which showcased the construction of a diatonic woodblock. Data were also collected from Nkpo Osisi area of Onitsha, where all kinds of wooden musical instruments are made. Later on, the paper was subjected to experimental and content analyses where the findings from the fieldwork revealed that modern tools are best in constructing a diatonic woodblock for accuracy with respect to tonality. A more scientific approach to its construction is hereby recommended to make it better refined.

Keywords: Construction, Diatonic scale, Woodblock, Modern tools

Introduction

Construction practice is in line with Olaniyan (1984:56) who affirms that, "the construction of a musical instrument such as *dundun* drum may involve different expertise that is, the artistic and scientific achievements through the collaboration of wood carvers, electrical machine, wood merchants and artistic designer". Different woods for the diatonic woodblock were tested for tenderness, durability and capability for high tone-quality. Tones generated must be consonant in order (for the woodblock) to be part of orchestral performances.

Among Africans, woodblocks are mostly aspects of other ensemble instruments. In other situations, they serve as the media of communication by passing vital messages to rural dwellers. In the present digital era, woodblocks have been restructured and modified using modern technological tools as against local materials such as cutlass, hand saw, hammer, and chisel that were used in the past. Modern tool uses simple machine to replace local tools formerly used in the construction of wooden instruments, including assorted membrane drums, slit drums, and woodblocks. Modern machine have economically helped technologists to construct musical instruments in large quantities within a short period of time. Some of the sampled machine include the grinding machine, nail guns, handled sanders, table saws, jig saws, mortising machine, wood routers, band saws, and thickness planners. These are simple stationary machine for woodworking or framing of any wooden musical instruments. Diatonic woodblocks are constructed with distinct measurements to ensure that they sound differently in both pitch and tone-quality, which are arranged manually according to each tone. They are labeled accordingly; arranged on a stand for easy performance; and played with two unpadded sticks. The said musical instrument is constructed within seven different tones and placed on a stand.

Various types of beaters are used to enable the instrument to emit sound. Most of the beaters are either wrapped with rubber, felt or yarn to produce definite pitches

and dynamic effects. Lizzie (2015:68) affirms that "light and soft producing beaters are wrapped with rubber heads for soft or quiet dynamic sound production". In specific term, this investigation would be based on how the woodblock is constructed to sound diatonic; the salient issues on using local tools to construct a diatonic woodblock; the performance context and role; and how modern machine affect the production of a diatonic woodblock.

The instrumental construction aims and objectives is to: examine the construction of the diatonic woodblock, discuss how modern machine was used in the construction; make the instrument play both harmony and melody in songs; show how modern tools affect the construction process positively and the technicality of the construction from the cutting, mortising down to the drilling stage and make this paper a reference material for other researchers.

In-depth interviews were held with woodworkers and musical instruments technologists from different parts of Delta state. The process was recorded on video tapes alongside pictures showcasing the interviews. Secondary sources such as journals, books, articles, and the internet were reviewed to support the paper. Data were also collected through experimental design which the researcher used to construct the various wood for making the instrument. The researcher enlisted woodworkers as research assistants to help him search on alternative wood for constructing the diatonic instrument. Moreover, he experimented mahogany and rose woods for the construction of diatonic woodblock and the end result was positive. All the interviews conducted were recorded and later analysed.

Theoretical concept of *Creative Destruction* by Schumpeter in 2019 was employed in this paper. Schumpeter (2012:11) earlier defined *Creative Destruction* as "the process of technological change by inventing new ideas and concepts, as well as observing new discoveries and adopting or imitating them". Woodblock is an already existing musical instrument in Africa just that it has never been

constructed to a tone in diatonic scale, which would have enabled the instrument to be part of an orchestra. Adopting this theory will also help in developing all other African musical instruments, by innovating them as the case may be. Friedrich (2000:18), pointed out that innovation is aimed at discovering new knowledge and values".

History of African Woodblock

"Woodblock, which is also described as a small slit drum or referred to as a petit slit drum, descended from the Muyu, an instrument from eastern Asia with only one tone block, which performed the role of systematic temple" (Cook, 2018:243). Brett (2000) constructed a three-tone woodblock and also performed on it. After watching the performance of the three-tone video, the researcher saw the need to expand it to a seven-tone diatonic scale, an African woodblock that can feature in a large orchestra. Adeyeye (1990) has earlier discussed the technology applied in *shẹkẹrẹ* as part of Yoruba shaking idiophones. He also emphasised that the construction of the Yoruba shaking rattle (*shẹkẹrẹ*) undergoes some processes and a lot of experiments before the final shape of what we have today, which is in line with the woodblock construction.

Faniyi (2011) observed the changes that have occurred in the construction of bembe, which was innovated by the use of modern tools and material to make bembe look like the western snare drum. The researcher used modern tools and machine while constructing the diatonic woodblock in order to fine-tune its tonequality so that it can fit into an orchestra. He innovated the woodblock to a diatonic woodblock, just as the oja of the Igbo race was innovated to a seven-tone oja flute, and finally processed to the various types of flutes as we can witness today (Onwubiko, 2018). These changes happen with the growth and development of technology .This innovation in African musical instruments has subsequently improved on the musical performance in the society. Onyekwelu (2011) affirmed that "the oja instrument was originated from the ugene seed (also known as

Nepolieneimplerialis), which grows in the bush before the use of the present material. Also, Euba (1990) and Olaniyan (2007) commented on the form of change that has acted on African musical instruments for example, the ordinary woodblock reconstructed to a diatonic woodblock.



Fig1. Picture of a Single Woodblock. Source from https://usmusicstore.com/products/hard-wood-block-instrument US music store

Woodblock, called *ban* in china, is partially Chinese band musical instrument. The Igbo tribe in Nigeria, later incorporated it into their ensemble's instrument known as *osisi ngongo*. Woodblock is sometimes referred to as clog box or temple block, which Schlagwerk (2000) classifies under idiophone family of instruments. Honbostle and Sachs did that as far back as 1933 and referred to it as not requiring stretched skin or strings. According to Marc (2011), a woodblock is seen as a wooden drum without membrane analogous slit, cylindrical, or parallel pipe form, with an opening and is of African origin.It came into existence before the use of clapper less metal bell (*agogo*), which the town criers use as a medium of communicating to the natives. The town criers hits the woodblock strongly to pass an important message to villagers with its rhythmic and penetrating sound.

Diatonic Scale Woodblock

There was a need to reconstruct woodblocks of seven pieces in order for each to emit a different tone when struck with a beater. A diatonic scale naturally consists of seven notes and is modal in ascending or in descending order.



Fig 2. Photo of the Researcher Mortising the woodblock

For example, phrygian mode is in the 3rd degree and is considered as E f G A B C D E while lydian is in 4th degree of a scale namely: F G A B C D E F; mixolydian is written on 5th degree as follow: G A B C D E F G. All these are modes on C-major but at different degrees of a scale. Diatonic scale can also be in a major and minor key. A major scale begins with the first note on the tonic while a minor scale begins with the first note on the sub-mediant. Precautions were taken while measuring the hollow region of the diatonic woodblock in order to evaluate the instrument for dissimilar frequencies. The instrument is constructed on the key of C-major which is a relative minor to A. The researcher's theory which states that "the deeper the hollow region of the instrument, the lower the frequency of tone

produced and the shallower the hollow region of the instrument, the higher the frequency of tone produce. This theory was used to achieve his aims and objectives in the construction of the diatonic woodblock.



Fig. 3: The Researcher Showcased Himself, Checking Each Tone of the Diatonic Woodblock.

Dayirmiter (2023) confirms that diatonic is a heptatonic scale which contains fivewhole-steps and two-half-steps altogether. Whole steps represent full tones while a half step is equivalent to a semitone. In other words, a diatonic scale has five tones and two semitones, depending on their statutory positions in a scale. The process of constructing a woodblock for it to exemplify a diatonic scale involves the confirmation of correct measurement as regards the size of the wood. While the instruments were being constructed, the researcher put into

consideration of the length of hollow, by tuning the instrument differently. The length of the hollowed woodblock and the size thereafter were put into consideration because they are the factors responsible for the change of pitch and tonal production of the instrument. The instrument was tuned to emit different tones identified with the diatonic scale. The tuning process was done alongside with the piano just as Olaniyan (2021) and Abiodun (2014), tuned and measured their Agidigbo (thumb piano) alongside with the standard Euro-American piano.

Ofuani (2017:50) asserted that "societies and cultures in Nigeria construct their musical instruments depending on the availability of raw materials such as wood, animal hides and skin, (locally available) metal, seeds and clay resources". The construction of diatonic woodblock was made from conwood. The instrumental construction begins with the purchase of a rosewood, chisel, saw, hammer and sandpaper, jig saw drilling machine and router. These hand tools are used for the construction. Different woods were tested and seasoned for tenderness, durability and capability for high tone quality before the construction of the diatonic woodblock took place. The wood was seasoned for about two months. Thereafter, it was measured and designed in a rectangular shape of seven different sizes. Each shape is 1cm apart in consonant with the diatonic scale. The wood was mortised to create hole in the instrument, which forms the resonator and makes the wood to generate adequate sound.

Modern Tools

In this study, the woodblock is constructed to sound diatonic with the use of modern machine to make the construction faster and devoid of much manpower stress. Before the diatonic woodblock was constructed, the researcher stressed on a theory of innovation by re-constructing woodblocks that will produce different definite pitches. The resonator emits sound when the instrument is struck with a stick. The researcher equally constructed a stick used to play the instrument. He uses a stationary table saw to cut the wood 1cm apart and 1ft length. The very stick

was smoothly scraped with the electronic planer for aesthetics and smooth handling. These are the modern tools used for the construction: table saw, jig saw, power drill, random orbital sander.

Table Saw: A table saw is the heart and soul of every wood working factory. It is a stationary machine that can cut any kind of wood or timber into various shapes and sizes. Table saw was used to cut the wood sheet to form a rectangular shape or a block shape with perfectly straight edges. The said woods were cut to different sizes of 1cm apart.



Fig. 4: Picture of a Table Saw. Retrieved from https://m.indiamart,com/proddetail/table-saw-cutter-23ts1-17193039291.html

Jig Saw: A jig saw is a portable electronic saw machine easily moved from one place to another unlike the table saw that is stationary. It was used to cut curve

patterns of the woodblock. A jigsaw is an essential tool for carpentry work because all kinds of curves and circle patterns can be created with the jigsaw.



Fig. 5: A Showcase of the Researcher Using the Jig-saw in His Workshop

Drilling Machine

A drilling machine was used to mortise hollow of the instrument. The holes were mortised inversely to emit various pitches from each of the woodblocks. The first woodblock has a hollow dimension of 10cm by 1 cm to brace each edge of the woodblock. To derive another pitch, the researcher took further measurement of 11cm by 1cm to mortise the hollow region of the woodblock. It was eventually discovered that the lengthier the hollow region, the lower the pitch of the woodblock; the smaller the hollow region, the higher the pitch produced. This method was used to calculate the frequencies and pitches of all other woodblocks.



Figs .6: Picture of the Researcher Using the Portable Drilling Machines for Mortising the Woodblock

The diatonic woodblock project produced each tone from the tonic, supertonic, mediant, sub-dominant, dominant, sub-mediant and leading note, which are the conventional seven degrees of the diatonic scale. Before the construction of the woodblock, the researcher went to the forests in search of appropriate wood. Although rosewood is the best for the making of the woodblock instrument, alternative woods that can serve the same purpose include iroko and mahogany. In the construction order, seasoning of the wood follow suit after the wood was harvested from the tree. Wood seasoning is the process of drying the moisture in the cell of a wood to ensure its durability for usage. Two main methods of wood seasoning are the Natural and Kiln. Natural method entails drying a particular

wood by means of air and sunlight without any application of chemical to the wood. Kiln method of seasoning involves use of chemical substances or electronic device to dehydrate a wood forcefully.



Fig 4. The Picture of the Diatonic Woodblock (Blockophone)

Dynamics of Constructing a Blockophone

Dynamics is the force or property that stimulates the construction of one tone woodblock to a diatonic woodblock. This change occurred by mortising various woodblock to sound in different tone. The instrument is therefore called **blockophone.** Blockophone is described as a set of eleven-tone woodblocks arranged from the dominant note to the tonic octave. The instrument is rested on an iron stand. Blockophone is tuned to the key of C-major and can be used to play simple songs within its octave. These changes have converted a single woodblock to a diatonic one thereby re-naming it a blockophone. The term block means that

the instrument looks like a block and phone means sound. It is therefore a sounding block instrument. Schlagwerk (2018) constructed four-tone woodblock in his video which he showcased on youtube. The durability of blockophone depends on the beater by using the appropriate mallet for the instrument. The researcher constructs a beater/mallet padded with a soft substance (foam and rubber). The use of modern tools for the construction of a blockophone was made easier. The rawmaterial employed for making the instrument is conwood and its innovation results in blockophone.

Blockophone and Lamellaphone

A thumbpiano is innovated as lamellaphone, an African traditional instrument, *agidigbo* (a large traditional thumbpiano plucked with and used by the Yoruba as a part of their traditional *apala* music in Nigeria). Some scholars such as Euba (1990), Samuel (2009), Adeyeye (1999), and Olaniyan (2011) have studied as well as written works on thumb piano.

Blockophone is constructed to be part of an orchestra; this is not far from lamellaphone, which was fetched from the new change (dynamics). The curiosity that provoked this study is traced to a particular scenario that occurred during my internship training at the University of Delta in Agbor, Nigeria, which involved my industrial based supervisor Mr Oghiator Kassim, who played on a local woodenslabs resembling a xylophone as well as demonstrated on the ogenephone, a set of petit clapperless metal bell sequentially arranged to produce a diatonic scale. As a result of this, the researcher decided to construct a blockophone. This specifies the gap that the present study gears to fill.

Conclusion

The construction of blockophone (diatonic woodblock) was made easy with the use of modern machine and tools. The size of each woodblock constructed is significantly different from one another because the main aim is to ensure that each

of the seven woodblocks emits different diatonic tones. This modernisation in constructing a diatonic woodblock has enhanced its portability and accessibility. If diatonic woodblock is given adequate promotion for its construction and technology, its music and technology will continue to survive in Africa. Based on the end result of this invention, more electronic broadcasting service and the print media (such as magazines and newspapers) should promote African traditional instruments including diatonic woodblocks. Similarly, organologists should engage in more researches to improve the constructional techniques and production of other African musical instruments, particularly their tone qualities.

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