

# Glass Gender Instrument Design Model by Toni Konde

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ABSTRACT	KEYWORDS
<p>The material object of this study is the form of a glass gender design model by Muhammad Sulthoni or Toni Konde as creators. The aim is to uncover and explain the shape of the glass gender design model from an organological and acoustic perspective. Another perspective concerns the methods and stages of experimentation that its creators go through. So, this article also reveals the innovation process in creating such musical instruments. The knowledge generated from this research provides a new understanding of the innovation model of traditional musical instruments. This knowledge has the opportunity to become a source of reference and learning material in the field of music education and creativity. This knowledge also benefits the creation and development of musical instruments, which will benefit community empowerment activities. This research shows that the barung gender inspires Konde's glass gender instrument model on the gamelan device of the Central Javanese tradition (Surakarta). Konde adopted the gender construction system as a 'reference' or 'reference' material to produce a new version of gender creation. This gender is worked on with selected and determined materials through exploration and experimentation. The characteristics of the work produced by Konde can be recognized in the method he applied, namely through the transfer of vehicles and collaboration based on the principles of reduction, reuse, recycle to maintain environmental sustainability and artistic creativity. The significance of this article is the recognition of new gender methods and formats that can stimulate the growth of new musical works.</p>	<p>Model, Glass Gender, Experiment, Waste Recycling, Trans-Medium.</p> <p>This is an open access article under the <a href="https://creativecommons.org/licenses/by-sa/4.0/">CC-BY-SA</a> license</p> 

## 1. Introduction

Art is a field that is always related to creativity. The pronunciation of the word creativity often follows conversations about art. This fact is related to the nature of the act of art, which indicates an act of creativity. Art is usually understood as concocting and organizing (commonly referred to as the activity of creating) objects of the medium of art into a work considered beautiful. The activity of concocting and organizing various objects in art is what makes it part of an act of creativity. In other words, art activities have a dimension of creativity. In line with the notion of creativity offered by Chandra, there is a process of seeding new ideas, which are original, progressive, and at the same time, represent a new leap or level in the mind of the originator. That idea or thought maybe someone else's that others can understand [1, p. 16]. As Chandra said, originality, progress, or the fact that there is a leap of thought in creativity seems commensurate with the aesthetic entity a work of art possesses. Beauty is an entity that contains things such as novelty, originality, progressive, unusual, or different from everyday reality. The content of this beauty entity is an evocative power that can stimulate the effects of certain feelings and thoughts, such as sadness, joy, and amazement, to awaken awareness. This is basically what makes the work of art so interesting.

The art of gamelan music is no stranger to the Javanese ethnic community and even to Indonesians outside the Javanese ethnicity. In general, gamelan is a set of musical instruments made of bronze, iron, brass, bamboo, and wood. In the context of creativity, the development of gamelan music creativity is quite slow. Even in certain circles, it has stagnated. Meanwhile, there is a novelty, but it is limited to the scope of certain groups, such as art institutions. Likewise, with the development of gamelan instruments, not many instrument creators have come up with brilliant ideas to create

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novelty in gamelan instruments. In recent years, apart from the creative leap to create new gamelan by gamelan maestro Aloysius Suwardi. The public of Solo and its surroundings have also begun to receive new gamelan sets from the *Wayang Sampah* community. The gamelan set is called the “*Gamelan Sampah*.” This naming is because all the instruments in the gamelan set are made of waste materials, including plastic, metal, and glass waste. Later, the Solo City Office Education and Culture (Dinas Pendidikan dan Kebudayaan) officers who visited the *Wayang Sampah* studio location were amazed by the community’s Garbage Gamelan set. As quoted from the daily *Radar Solo*, they admit that they are amazed because the sound of gamelan from waste or used goods are not inferior and is even said to be able to resemble the sound of gamelan in general, which is made of metal” [2, p. 7].

The *Wayang Sampah* community was officially established on June 30, 2014. The initiator of this community formation was Muhammad Sulthoni (46 years), known in his environment as Konde, and Praba Hardini (39 years), familiarly called Denok. The formation of the *Wayang Sampah* community is a form of critical response by the initiators and their members to the issue of environmental inequality. Throughout its journey until now, *Wayang Sampah* continues to try to be consistent, not only campaigning for concern for environmental issues but also for the preservation of local Indonesian culture. The number of members in the *Wayang Sampah* community has now reached around 20 people. The members come from various fields, such as art practitioners, traders, students, teachers, etc. The *Wayang Sampah* performance by the *Wayang Sampah* community has also colored the world of puppet art (*dunia pewayangan*) in Solo. The presence of this community is enough to attract the attention of artists, cultural actors, environmental activists, and event organizers both locally and outside the city of Solo so that the *Wayang Sampah* community is often invited and involved in various events such as performances and workshops. Equally interesting is residents’ enthusiasm around the Mojosongo sub-district for *Wayang Sampah*. This interest then gave birth to a new *Wayang Sampah* group (outside the *Wayang Sampah* community), namely the village version of the *Wayang Sampah* group or residents in the Mojosongo sub-district.

Konde is the main creator of wayang and gamelan instruments that belong to *Wayang Sampah*. At first, Konde only made wayang puppets from materials such as used plastic bottles, used plastic bags, and used plastic pipes (PVC). A few years later, Konde started trying to make musical instruments from used household items he collected through friends, neighbors, and trash banks. Until now, the number of musical instruments that Konde has made reaches approximately 20 pieces. These musical instruments include guitar, ukulele, violin, cello, contrabass, including a set of *gamelan gadhon* including sliding gongs (*gong geser*), Konde gongs (*gong konde*), PVC flutes, fiddle (*rebab*), zither (*siter*), glass saron, glass gender, glass slenthem, tube bonang, and bottle bonang. Apart from the relatively economical production price, using used goods that are wasted and considered “garbage” is also a separate value in Konde’s creative act. Reduce, reuse, and recycle are the creeds that Konde and the members of *Wayang Sampah* continue to uphold in every act of their creativity.

All the musical instruments that Konde has made in the *Wayang Sampah* community are very interesting to discuss, especially in more serious forums such as in the academic realm. In addition to the environmentally friendly aspect, which is an important point that Konde offers through its musical instruments, technical aspects such as acoustic organology systems and the musical potential of these musical instruments also deserve attention.

So far, many studies on innovation and experimentation in creating musical instruments have been found in scientific publications. However, research on inventions and innovations in materials and forms of traditional Javanese gamelan musical instruments is still very rare. The creativity of Muhammad Sulthoni (Toni Kode) in engineering sound mediums through the use of waste and used goods has been revealed by Setyawan (2019)[3]. Widyastuti (2022) explained that Konde's innovative work in making gamelan made of glass used by the Song Meri Studio was for cultural preservation efforts in Pacitan Regency, East Java[4]. Widiastuti et al. (2020) also revealed musical instrument innovation, namely applying the *kulcapi* innovation product [5]. Fauzi et al. (2021) regarding the process and stages of making fretted violins[6], Susetyo (2018) regarding the use of used goods in increasing learning creativity[7], and Irawan et al. (2018) regarding the Ragam Laras

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Pentatonic Angklung as a product of experimentation and innovation from traditional Sundanese Angklung which can provide new offers in the development of society's creative industries[8].

Unlike previous studies, this research departs from an ethnomusicological disciplined approach to reveal and explain the problem of the invention of design models in creative work, particularly the 'gender glass' instrument made by Konde. Models generally represent objects, objects, or ideas in a simplified form of natural conditions or phenomena. The model contains information about a phenomenon that aims to study the system phenomenon. A model can imitate an object, system, or event containing only important information to study [9, p. 1]. The model can be interpreted as a "projection," implying an abstraction as a representative or representation of an original reality [10, p. 2]. Within the paradigm of music creation, the form of a model is the original perspective of a musical form or construction in the composer's imagination that is to be worked on and transformed into music [11, p. 105]. Based on this understanding, observation, and deepening of the glass gender design model made by Konde will reveal a system that contains a building structure of knowledge and its phenomena or symptoms.

Glass gender, or Konde's version of gender, has a novelty regarding materials and acoustic or resonance systems. Konde makes the blades of the glass gender from used glass, while the resonator tubes use *paralon* or PVC. Although made from used goods, this instrument can be used as a source of reference and learning creativity in developing innovative Javanese gamelan instruments. The advantage of this instrument lies in the affordable production costs, compared to the production costs of making conventional gender made of metal (bronze, brass, and iron). The instrument's shape, sound quality, and the playing technique of the glass gender instrument made by Konde are also quite applicable for creative activities and the development of gamelan music forms. Therefore, it is hoped that research on the gender design model for glass made by Konde will be able to contribute to the scientific development of gamelan music in organology, instrument experimentation, and music composition.

## 2. Method

This study uses a qualitative narrative approach based on personal experience stories from the author, which are supported and strengthened by observational data, documentation, measurements, and literature studies. The subject and the main resource person for this research is Muhammad Sulthoni, the creator of the glass gender musical instrument in the *Wayang Sampah* community whose secretariat is at the *Sanggar Matahari Jawa*, Jl. Letnan Jenderal Sutoyo, Gg. Ngadisono, RT 03 / RW 14, Kadipiro, Banjarsari District, Surakarta City, Central Java.

The data collected comes from (1) information and knowledge from sources, (2) facts about objects obtained from observations, visual documentation (photos), and tone system measurements, and (3) data from the results of a literature study used to help analyze and explain the data that has been collected.

Data collection was carried out through observation activities, namely observing the instrument's shape, the process and stages of manufacture, and the technique used in staging. Observations were also supported by instrument documentation activities in the form of pictures or photos and measurement of the tone system through an application based on the Android Smartphone system, namely *Best Tuner* (developed by Netigen Kluzowixz), which is available on the *Google Play Store*.

The data obtained from observation, documentation, and measurement are further explored through interviews with informants to be analyzed, explained descriptively, and generalized in scientific knowledge through related concepts, theories, and explanations originating from bibliographical data.

## 3. Results and Discussion

### 3.1. Toni Konde's Art Journey

Muhammad Sulthoni (Toni Konde) was born in Tanjung Karang Bandar Lampung on October 12, 1976. He was born to a couple of Javanese blood (Yogyakarta and Surakarta), namely Munatsir Amin (father) and Nurwasis (mother). Elementary School (SD) to Senior High School (SMA)

education was passed by Konde in Bandar Lampung. After graduating from high school (SMA), in 1995, Konde decided to go abroad to the area of origin of his ancestors, namely the city of Surakarta, with the intention of further studies at university.



**Fig. 1.** Toni Konde, during the interview process with researchers

In Surakarta, Konde lives in the house his grandfather (grandfather) left with his brother. Plans to continue their studies at university changed after Konde was invited to climb Mount Lawu by one of his siblings (a cousin called “*mas*” by Konde). The charm of Mount Lawu and the friendliness of nature-loving youths (the forerunners of the AGL – *Anak Gunung Lawu* community) at Cemoro Kandang made Konde interested in coming often and even living there. Due to Konde’s great intensity and good association with young nature lovers (*pemuda pecinta alam*) in Cemoro Kandang, in 1996 he was then offered a job as a fuel supplier for a transmitter (Indolink company tower) located on top of Mount Lawu.

For about 2 years Konde worked as a fuel supplier for the transmitter at the top of Mount Lawu. On the sidelines of his work, Konde is also active in making voluntary environmental awareness campaigns with young nature lovers in the Mount Lawu area. The impact of the voluntary activities carried out by Konde and the Cemoro Kandang youths gave birth to a community called AGL (*Anak Gunung Lawu*). AGL’s presence received attention from the local government; as a result, AGL was given trust, and authority, and what was equally important was the legality of Perhutani Karanganyar’s law.

In 2001 Konde tried to realize his intention to continue his education at university. Konde decided to enter one of the tertiary institutions, namely PPKP Yogyakarta Polytechnic, with a D-3 study program in Dutch for Tourism. However, not until graduation did Konde’s love for nature and his activities on Mount Lawu again attract him to return to Cemoro Kandang and continue his activities within the AGL community.

Being active in various AGL activities has allowed Konde to meet and get to know new people from various backgrounds who are also concerned about environmental sustainability. Particularly in the artistic context, in 2008, Konde met environmentalists, including Wisik Sunaryanto (vocalist of the *Pecas Ndahe* humor orchestra) and Lawu Warta, now better known as *mbah* Lawu (alumni of the *Bengkel Teater*). Konde’s meeting with the two artists was an important moment that became the gateway for Konde’s involvement in art and the arts. At first, Konde was only limited to being a spectator and crew in the *Wayang Eling* collaborative art activity carried out by Wisik Sunaryanto, *mbah* Lawu, and several international students taking the Darmasiswa program at ISI Surakarta. Konde’s intensity and integrity in these activities led him to become involved as a member of the collaborative group.

Konde’s acquaintance with students or people from abroad through the *Wayang Eling* collaborative art activities made him enter the art world even further. On one occasion in 2010, Konde and Anna Rzeznik (Darmasiswa from Poland) created a collaborative art project called *Wayang Burung*. In 2011 Konde met local artist Messias Risang and artist from Japan Yukikko Sakine (artist and Darmasiswa). The meeting led to a collaborative art project called *Wayang Saru* (Literary and Visual Puppets). Collaboration in the work of *Wayang Saru* dragged Konde into the world of Batik art. In that project Konde, Messias Risang, and Yukikko Sakine had to learn batik through home-

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based batik industry players in the Laweyan batik village, Surakarta. The *Wayang Saru* collaborative project was then halted because Konde, Messias Risang, and Yukiko Sakine discovered that the batik dyes they used to study and those used as production materials by the batik industry where they studied were artificial (chemical) dyes. It is even sadder for them to witness the bad habits of the batik industry players, who generally throw their batik dye waste into the river around their houses. Konde and his two colleagues admitted to feeling guilty about what they witnessed.

At the end of 2011, Konde traveled to a village in Imogiri to visit mbah Lawu. Arriving in Imogiri, Konde did not meet mbah Lawu because he got lost in the Giriloyo batik village, which happened to be close to the village where mbah Lawu was. The wrong address moment turned out to be a good thing for Konde, because he received information from residents that the Giriloyo batik industry is a batik industry that dyes its products with natural dyes, namely organic materials. Based on this information, Konde became interested in learning batik and temporarily stayed in the village. The friendliness and seriousness shown by Konde in interacting in the Giriloyo batik village made his arrival welcomed. They were even accepted as a student by one of the residents of the Giriloyo batik industry. Konde's process of studying batik with natural dyes in Giriloyo village lasted for approximately 3 months.

Konde returned to Surakarta in early 2012, then settled and resided at the Matahari Jawa Studio (*Sanggar Matahari Jawa*) which is located on Jl. Letnan Jendral Sutoyo, Gg. Ngadisono, RT. 03, RW. 14, Kadipiro, Banjarsari, Surakarta City, Central Java. In Surakarta, he received an offer to make a collaborative art project with Bejita (a fine artist), eventually giving birth to *Wayang Beber Welingan*. This collaborative art project lasted until 2014 and has done many performances. The art project with Bejita at *Wayang Beber Welingan* was completed in early 2014. In that vacancy then, Konde and Denok (musician), on June 30, 2014, founded a community called *Wayang Sampah*. *Wayang Sampah* has existed and shown consistency from its inception until now. In the *Wayang Sampah* community, Konde's artistic productivity has increased. Konde's creativity in *Wayang Sampah* is not only limited to making puppets, playing music, or being a puppeteer like any other art project he has done before. In the *Wayang Sampah* community, Konde makes new musical instruments from waste materials or used goods. Until now, approximately 20 used musical instruments have been made by Konde.

All the art projects that Konde has gone through, from being a follower to becoming an actor, initiator, and creator of art projects, his spirit cannot be separated from Konde's love for nature conservation, including local culture. The whole project is Konde's real action and response to the problem of ecological inequality. Therefore, the embodiment of Konde's artworks is provocative and educative, aiming to raise awareness about the importance of preserving nature and local culture.

### **3.2. Principles, Methods, and Stages of Work**

The gender instrument created by Konde is made of glass. This creation was based on an experimental approach through the vehicle transfer method. Experiments on the creation of musical instruments, in this case, are very much different from experimental research to prove the truth of a theory. Sunarto et al. [12] explained that an artist experimenting with creating a piece of music also conducts research. However, the final result is an artistic work (art). The experiment in creating glass gender instruments conducted by Konde is similar to the music described by Sunarto [12], which is more a proof of whether or not the elements or materials prepared for making instruments can be worked into new artistic propositions with certain approaches.

The experimental approach taken by Konde in creating glass gender instruments departs from designing a model that he thinks and imagines to be realized in the form of works. The model is the design of the work, a description of the meaning and phenomenon to be realized [13]. In designing and producing glass gender instruments, the model designed by Konde is sourced from material objects in the form of (1) models of gender instruments in Javanese gamelan and (2) used items that are no longer used (garbage) as materials. The selection of the two material objects was determined based on possible considerations regarding the sound potential and the characteristics of the existing material. Then, making material objects as transfer media that can accommodate sound needs and playing techniques that are not much different from gender instruments in Javanese gamelan.

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Konde's life background has a major influence on the principles and patterns of Konde's artistic creation. Javanese locality or Javanese art is strongly manifested in Konde's artistic creations. This fact seems not only because Konde loves art, especially Javanese, or because he is of Javanese descent, but also a strategy so that the surrounding community in Surakarta easily accepts the works of art he creates. Konde's love for preserving nature and Javanese culture guides his practice in art, especially as the basis for developing ideas in each of his works. His creative process in the *Wayang Eling*, *Wayang Burung*, *Wayang Saru*, *Wayang Beber Welingan*, and *Wayang Sampah* projects closely relates to Konde's status as an environmental activist and his identity as a Javanese. Creating a glass gamelan set as a musical ensemble to accompany *Wayang Sampah* is a testament to the connection between Konde's background or principles and beliefs and his art's embodiment.

Using waste and used goods as materials for making glass gamelan (*gamelan kaca*) sets is intended as an alternative solution to dealing with environmental pollution. *Gamelan Kaca* is a community where used goods or those considered waste can be turned into useful items. Konde explained that preserving the environment can start from a small scope, such as in a family processing their waste independently by reducing, reusing, and recycling.

The characteristics of the work done by Konde can be recognized in his method. The first is the media transfer (*alih media*) method, which means more or less the same as the concept of *alih wahana* described by Damono [14, p. 13], namely the process of transferring from one type of 'wahana' to another type of 'wahana'. The word 'wahana' can mean 'vehicle' or 'media', which is the transfer and composition. The fact is that 'media transfer' in creating works was carried out by Konde by studying and exploring the organological principles of conventional musical instruments. The deepening is to be used as a source and reference in creating musical instruments through media transfer and composition. Determining the source of the work referred to is carried out by adjusting the availability and organological potential of existing used goods. Making musical instruments through the media transfer (*alih media*) method requires adequate knowledge, skills, and genius and high creativity. Media transition requires an innovating strategy to adapt the model of artwork which is the source or reference for the work to be accommodated in the transitional media, meaning that used or waste items that are selected and determined as transitional media still need to be further processed and arranged so that they really become usable works.

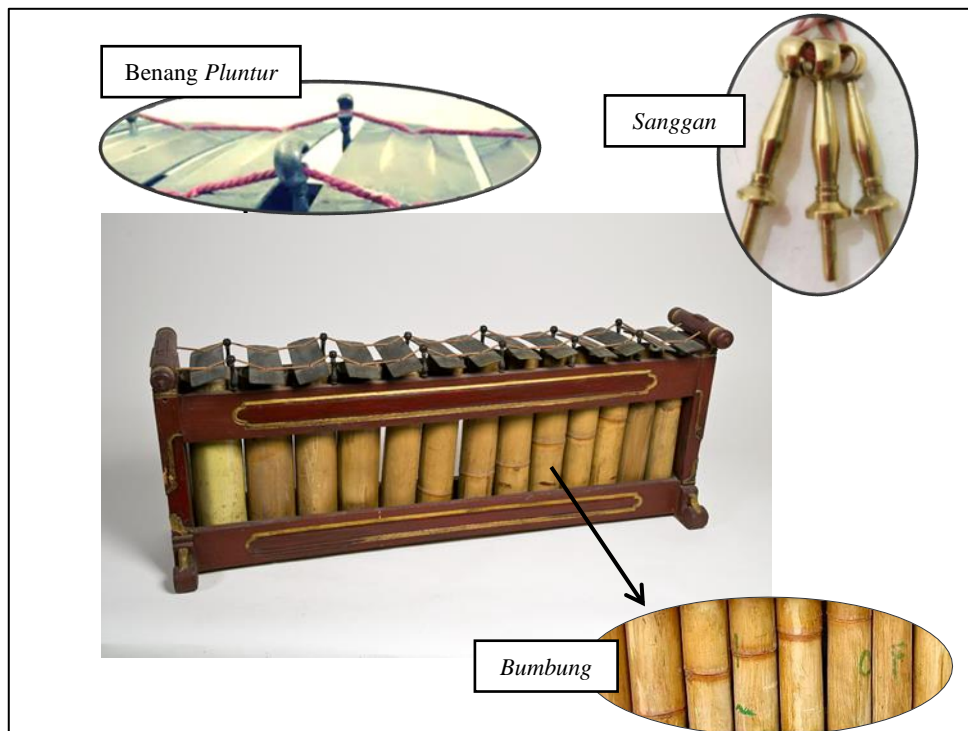
The method of switching media can be observed in several works by Konde, for example, converting Javanese gamelan into new gamelan instrument models that Konde made from used glass, *paralone* (PVC), and gas cylinders (LPG). The difference in materials used in making gamelan is a challenge because it is necessary to understand the nature and potential of the materials used to fulfill the feasibility of sound and its use. These used or waste items must be processed, arranged, and arranged to produce sound quality similar to the sound color of conventional gamelan instruments.

The next method in Konde's work is collaboration. Collaboration is an act of cooperation, either incidentally or as a community. Konde used this collaboration to actualize his artistic creations, especially musical instruments. Equally important for Konde in the collaboration process is the dialogue with the artists regarding the new musical instruments created by Konde. Through the dialogue in the collaboration space, Konde often gains new knowledge, namely knowledge that is of value to him as a basis for developing the works of art he makes.

### 3.3. Form of Glass Gender Model by Toni Konde

Gender is one of several musical instruments in *ricikan* or Javanese gamelan sets. This musical instrument is rectangular pieces arranged on a plan (*rancangan*) made specifically for the instrument or gender. In Javanese gamelan music culture's traditional conventions (*pakem*), the gender pieces are made of iron, bronze, and brass. Meanwhile, the gender plan (*rancangan*) itself consists of; 1) a wooden frame as the basic frame for roof support, pneumatic ropes (*tali pluntur*) and supports for gender slats; 2) a roof (*bumbung*) made of bamboo or zinc (metal) and in the form of a cylindrical tube as a resonator; 3) *pluntur* rope (special thread) that stretches as well as binds and supports the gender slats from both sides of the *rancak*; and 4) brackets (brass, bronze, iron, wood, buffalo horn, bamboo) or special nails to support the ropes that stretch and support the gender blades.





**Fig. 2.** Gender Instrument Construction

In the treasures of Javanese gamelan music, especially in *gamelan ageng* or *gamelan jangkep* devices in Central Java, there are two types of gender classified based on their musical role, namely the *gender barung* and the *gender penerus*. Both the *gender barung* and the *gender penerus* each are divided into three types to adjust the needs of the laras and pathet used in the tuition of the karawitan gendhing, namely the laras slendro, the *laras pelog barang*, and the *laras pelog bem*.

The gender instrument made of glass by Konde is inspired by gender contained in the Central Java traditional gamelan device as described above. 'Inspired' in this context means that the construction system of the tradition of gender instruments is the material 'reference' in making glass gender. In other words, Konde adopts the construction system of gender musical instruments tradition as a glass gender design model he made. The action of adoption, in this case, does not mean copying or imitating the system that exists in the gender instrument of tradition, but some adjustments occur. The adjustment action is the reality of the exploration and experimentation process that Konde passed in manufacturing glass gender.

This exploration in the manufacture of glass gender relates to Konde's main principles and objectives in gender production: efforts to protect the environment. He always tries to reduce, reuse, and recycle used goods that are considered useless. Therefore, for him, used goods or waste are valuable items that are believed to have the potential to be processed into basic materials for making gender musical instruments. While the reality of experimentation cannot be avoided because different materials have different properties and characters, treatment must follow the material's nature and character.

### 3.4. Glass Gender Form Construction

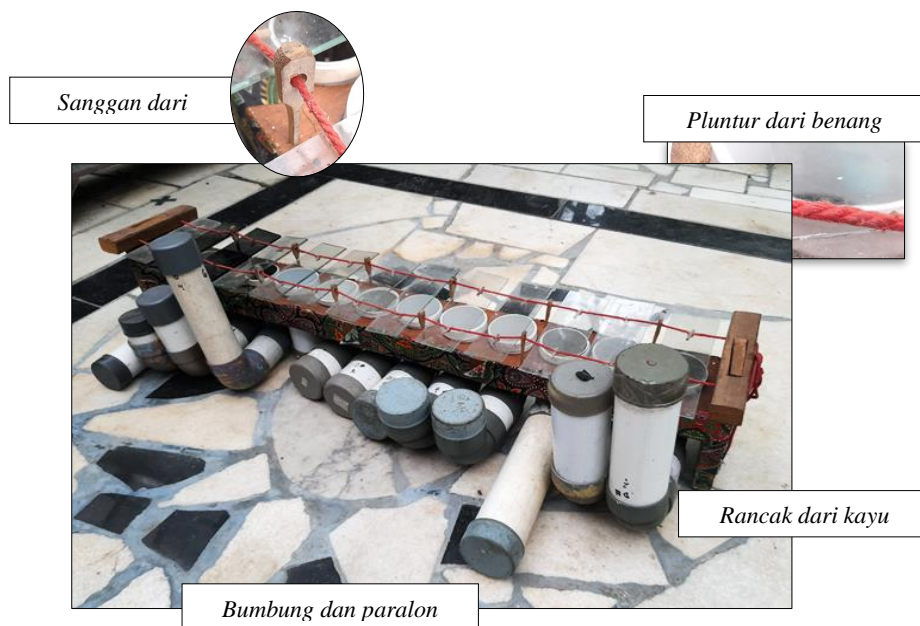
The materials used in constructing glass gender include used glass, wood, *paralon* pipes (PVC), threads, and bamboo. The entire material is used goods that have been discarded or rubbish that is easily obtained by Konde in residential areas in Surakarta. The materials are then processed into component materials in the gender structure. The used glass was chosen as a basic material for making gender blades, while used wood as a *rancak* material or the overall buffer frame of the material in the gender instrument body. The used *paralon* pipe (PVC) is selected by revenue as a *bambung* material or resonator tube, then a used thread as a *pluntur* rope and bamboo as a *pluntur* rope support (*sanggan*). The exploration and experimentation measures of manufacturing gender

from unusual materials have given birth to a new gender, called *Konde* with “gender kaca” or glass gender.



**Fig. 3.** Glass Gender Picture

Glass gender resulting from creativity is a relative form of a shape similar to gender in the Javanese gamelan tradition. The similarity in aspects of the construction of the form includes principles, namely the components, elements, and structures in the gender instrument. These components consist of elements from (1) *wilahan* for producing pitched sounds, (2) *rancak* (planks) for arranging *wilahan*, such as the construction of gender instruments in the Javanese gamelan tradition. In *rancak* then there is also a *bumbung* as resonator, a *pluntur rope*, and *sanggan*. From the structure aspect, the component order contained in the glass gender is the same as the gender in the Javanese gamelan tradition.



**Fig. 4.** Glass Gender Structures and Components

The significant difference in the context of the construction between glass gender and gender in the gamelan tradition is a resonator *bumbung* arrangement. The resonator (*bumbung*) in the gender instrument of gamelan traditions is arranged vertically, exactly below each gender bar. In contrast, the construction of the *bumbung* in the glass gender is irregular, as shown in the picture above. The difference in the form of construction occurs due to adjustments to the availability of materials. In making the glass gender, the condition of the used *paralon* available is short-sized average. The *paralon* connections available are mostly in the form of letter L. Limited materials are then converted to the glory by connecting the *paralon* pipes. Considering that most of the connecting *paralons* are in the form of the letter L, the roof's construction must be in the form of the letter L and the letter U. The connection length of each *paralon bumbung*, is different from each other. The size follows



the tone produced by each glass *wilahan* and the volume level in each *wilahan*. The limitations of wood as a *rancak* frame are also reasons for Konde in managing the shape of the glass gender. The Konde then tricks these limitations by making a smaller *rancak* frame than gender *rancak* in general in the Javanese gamelan tradition.

### 3.5. Tone System

The tone system or *pelarasan* refers to using tones in an instrument with a interval (*jangkah*) between tones to produce a certain musical sense. The tone or *pelarasan* system in this discussion refers to the glass gender instrument made by Konde. The glass gender has thirteen (13) blades or *wilahan*, each representing a tone. This glass gender has a tone area similar to the *gender barung* on the Javanese gamelan device. *Gender barung* on the Javanese Ageng Gamelan devices generally starts from the 6 (*nem*) tone, but the gender on this glass gamelan device starts from the tone of the *penunggul* (pn) or commonly also called the 1 (ji) tone. The number of tones used by *gender barung* on the Javanese Ageng gamelan device is usually fourteen (14) pieces, 6 (*nem*) tones as the lowest tone, and 3 (lu) tones or *dhadha* (dd) tones as the highest tone. This is different from the arrangement of the tones in the glass gender. From the lowest to the highest tone will be obtained as follows.

**q w e t y 1 2 3 5 6 ! @ #**

**Annotation:**

- 6 = *nem*, abbreviated *nm*
- 1 = *ji* or *penunggul*, abbreviated *pn*
- 2 = *ro* or *gulu*, abbreviated *gl*
- 3 = *lu* or *dhadha*, abbreviated *dd*
- 5 = *ma* or *lima*, abbreviated *lm*

The tone of each glass gender blade made by the Konde is arranged (*dilaras*) following the *babon* (reference) on the tone in a Gamelan application is available on the Google Play Store, the Gamelan Jv application 1.7.2 version developed by Aditya N I Soewidiatmaka. Recording of each note based on frequency. An analysis of the size of each note in Konde's glass gender can be seen in Table 1.

**Table 1.** Tone Coverage of Glass Gender Instruments Created by Konde

Nada	q	w	e	t	y	1	2	3	5	6	!	@	#
Frekuensi (Hz)	147	156	175	220	233	293	311	349	440	466	587	622	698
Jangkah Nada (Sen)	102	198	396	99	396	103	199	401	99	399	100	199	
Struktur Jangkah	p	p	j	p	j	p	p	j	p	j	p	p	
Jk Gby 1 (Sen)	1191												
Jk Gby 2 (Sen)	1192												
Jk Gby 3 (Sen)	1193												
Jk Gby 5 (Sen)	1198												
Jk Gby 6 (Sen)	1198												

Keterangan: p = *jangkah* pendek kurang dari atau sama dengan 240 sen; j = *jangkah* jauh sekitar 290 sen; dan Jk Gby = *Jangkah Gembyang*

Based on the table above, it can be analyzed that the *laras* used in this gender instrument is the *laras pelog bem* or *pelog pathet nem* because it does not use the tone of *pathet barang* (4 and 7). The lowest tone is tone 1 with a frequency of 147 Hz, while the highest note is the three tone with a frequency of 698 Hz. The frequency of all tones above is measured through the Best Tuner application developed by Netigen Kluzowixz and is available on the Google Play Store.

The interval (*jangkah*) between the tones is expressed in cents, with a structure that tends to have a short step. The structure of the step can determine the *embat* or musical sense. Hastanto [15, p. 70] believes two types of *embat* are known in Javanese gamelan devices: *Embat Sundari* or decay (*luruh*) and *Embat Larasati* or *sigrak*. In the context of gamelan scattered in various regions, the mention of

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*embat* can vary as far as the subject of supporting art can declare or give a symbol of the musical sense obtained from the playing gamelan. Representation of *embat* is usually taken from the character of the leather puppet play. The first tone of gender played by the pengrawit, by the puppeteer, becomes the guideline for bringing out the character of the wayang voice. Based on the theory of Hastanto [15], this glass gender has an *Embat* Sundari that produces a decay (*luruh*) of musical atmosphere. This musical atmosphere is a consequence of the number of short or narrow intervals of some of the tones produced by the Glass Gender Blades

*Gembyang* in the table refers to two notes, which, when played together, have one or the same taste. *Gembyang*, from the perspective of musicology, can be understood as a tone of the same tone in one octave or the eighth tone that is standardized 1200 cents from the first tone. Measuring the 1200-cent tone distance can produce a pleng tone, so if the two tones are played together, it will sound like only one tone. This table shows that there are six *jangkah* that are not exactly the same, namely: 1191, 1192, 1193, 1198, and 1198 cents. This data confirms that this glass gender instrument is not made “*plêng*.” This glass gender has a “*ngêng*” to produce the impression of echo or waves. As far as the existing research data has been found, there has never been a *Gembyang* Step of less than 1200 cents, such as the one in the Konde glass gender. Pelaras gamelan usually “shakes” or negotiates the tone of the *Gembyang* above 1200 cents. From the results of the discussion of this tone system, it can be concluded that the glass gender made by the Konde is unique compared to gender in Javanese gamelan in general.

#### 4. Conclusion

This study shows that the Gender barung inspired the glass gender instrument model made by Konde in the Gamelan Tradition of Central Java (Surakarta). Konde adopts the gender construction system as a ‘reference’ material to be worked on the materials that have been selected and determined through the exploration and experimentation process. The form of the glass gender instrument model made by the Konde uses laras pelog *bem* or pelog pathet *nem*, because it does not use the tone of pelog barang (4 and 7). The number of glass blades from the lowest tone to the highest note is 13. The lowest tone is the 1 (*ji*) tone with a frequency of 147 Hz, while the highest note is tone 3 (*lu*) with a frequency of 698 Hz.

Characteristics of the work carried out by the Konde can be recognized in method it applies. The creation of gender instruments from glass carried out by Konde rests on the experimentation approach through the alih wahana method. Exploration in making glass gender relates to the principles and main objectives in efforts to protect the environment by reducing, reusing, and recycling. At the same time, experimentation is carried out in the stage that proves its basic belief in the potential for sound and character of the material considered appropriate and precise to be used in making instruments.

The next method of revenue is collaboration. Collaboration is an act of cooperation both incidentally and in a community. The collaboration was used as a room to actualize his artwork, especially musical instruments. No less important for Konde in the collaboration process is the occurrence of dialogue with artists related to new musical instruments created by Konde. Through dialogue in the collaboration space, Konde often gets new knowledge, namely knowledge that is valuable for him for the basis of the development of the artwork he made.

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