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Exploring the Potential for Innovative Development of Traditional Musical Instrument

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ABSTRACT

Rebab or rabab is one of the traditional musical instruments for the performance of *KelantaneseMakyung.* It's a stringed or chordophone instrument, played like a violin in a vertical position. The components were assembled together with the very traditional look of Southern Thailand and the Kelantanese. It is very difficult to make *'Kelantan's Rebab'* in the modern society. One of the main reasons for this is the difficulty in obtaining raw materials. Production is very limited and, in addition to the lack of Kelantan's Rebab player, generally in Malaysia. Another aspect is the emergence of new technology, which produces more consumers than designers or craftsmen in the manufacture of traditional musical instruments. Researchers have identified the need to study alternatives to the Kelantan's Rebab manufacturing process, which is more economical in terms of time, materials and processes. The main objective of the study is to propose a new process for Kelantan's rebab through an industrial design approach. This study was conducted through interviews and observation in order to experience the performance and basic knowledge of Rebab 's components. Finally, this paper shows possible ways to develop a rebab through the 3Dparts modeling generation process for further development.

Keywords
Traditional music instruments; Industrial design; 3D modeling; rabab

Introduction

Rebab or rabab is a friction musical instrument in a chordophone group. The instruments of the membranophone group and idiophone are even more attention in this archipelago region traditionally compared to chordophones [1]-[2]. The shortage of skilled rebab makers is the key reason why these traditional musical instruments are not as common as other musical instruments. Drums and gongs, for example, are more common than the traditional rebab musical instruments. Rebab is said originally from the Middle East or the Arab States or Persian region [3].Rabab or Arab rababah, the Arab string, the first known bow instrument and the ancestor of the mediaeval rebec of Europe. It was first mentioned in the 10th century and was popular in mediaeval and later Arabic music. In mediaeval times the word rabab was also a common term for any bent instrument [4]. The rabab has a belly membrane with two or three strings. While playing, the strings are stopped by the fingers of the player. Pear and boat-shaped rababs were particularly common and influenced by the bowed string instrument of the medieval era called rebec. These rabab shapes can be found throughout the Middle East and Africa, as well as Central Asia, Northern India and South East Asia. In Indonesia, rebab is also known as a traditional musical instrument in the chordophone group. Rebab is an important instrument in elaborating and decorating basic melodies in *gamelan* Indonesia or known as *karawitan*[5].

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In southern Thailand and northern Malaysia, rabab or rebab is presented in a common ritual performance called *makyung*. This ritual gets more energetic as the rebab, followed by pipes, kesi, canang and gongs, is amplified [6]. These musical instruments are honoured in the opening ceremony of the *makyung* performances. Kelantan's Rebab (KR) is the only musical instrument in *makyung* performance that has strength in terms of intensity and sound quality. In addition, the KR still has a great ability as an independent music without the assistance of other instruments. By uncovering the existing potentials, and then preparing new proposals it is hoped that KR will no longer be seen as a complement to one purpose only. It will be viewed in line with other instruments that present cultural art and even associated with modern music. This definitely happened in a song called 'Journey' composed by Zahid Ahmad and MukhlisNor, which had the beginning of the KR rhythm before the jazz arrangement continued [7].

Literature Review

In general, it is known that the 21st century is the era of the globalisation. Overall economic utilization through this era, posed a great threat against culture[8]. Economic globalisation, essentially, provides an inclusive view of economic existence, without acknowledging borders or territories between countries. Today, we can see that with the advent of information technologies, the culture of much of the world's population, whether living in urban or rural areas, have shifted [9]. It is important for us to uphold or maintain the arts and culture of our society. Supposedly with the availability of technological advancement we can further evolve and introduce the arts and culture to the world. Culture is so important because it is the driving force behind the economic development of civilization [10].

After arrival in the archipelago, especially in the state of Kelantan, the traditional music was improvised according to local tastes in terms of the play performances, the composition of the song and its appearance towards to local culture [1]. The wisdom and the love of the Malays in traditional arts such as music and carving produce their own unique designs. Nevertheless, many of its uses in some areas of the Malaysian peninsula as in Kedah have been extinct in the ages. However, Rebab Kelantan is still playing in *Makyung's* theater which has been recognized by UNESCO in 2005 as 'A Masterpiece of the Oral and Intangible Heritage of Humanity' and was inaugurated into a world-artistic heritage. This culture is a whole complex of spiritual features, materials, intellectual and emotional distinctiveness that characterizes a society or group social [12].Today, the world's cultural heritage is something of immense importance, reflecting the nation's identity [13].

It is divided into two types that have their own characteristics according to the way of playing. *WayangMelayu*, which are now extinct using the Two-String Rebab while *Makyung*, *Main Puteri*, and *Tarik Selampit* use Three-String Rebab which is the basis of this study [11]. Physical KRK is divided into six parts namely, *Kepala, BatangSerunai, Torak, Batang Rebab, Tempurung* and *Kaki*. Each section has other parts according to its function. The physical form of KR symbolizes women where several parts are named *susu, talikemban, pinggang, punggung, tumit,* and *rambut*. While the bow has eight parts namely *Pemegang, Sirip, Batang, TaliPenggesek, Enggoh, Dahi, Mata Klewang* and *Muncung*. Traditionally, KR through several fabricating processes such as lathe, dredging, drilling, carving, sticking and various processes in preparing a

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Rebab. Materials commonly used are jackfruit wood, nylon strings, cowhide leather, and stingless bee nest for milk. Some innovations in terms of materials have been made by Rebab players like the strings were replaced with modern guitar strings which are louder and more readily available on the market [11]. Previously, the hair (fiddle bow) uses coconut shell or leaf sheath and are now replaced with nylon strings. Now it is very difficult for KR producers to produce Rebab because of the difficulty of getting the raw materials as mentioned above. The production is very limited plus the lack of KR players in the 21st century. The chordophone musical instruments are less welcome in the music ensemble in Southeast Asia. While the instruments like membranophone and idiophone groups are even more attention in this archipelago region. Unlike in Indonesia, the two-string Rebab is used in gamelan performances. The lack of KR maker among its factors is the reduction of skilled Rebab makers, therefore, the production also decreases. Another factor is the development of modern technology that creates more users than makers or craftsmen of traditional musical instruments. The researcher sees the need to study the alternatives to the KR manufacturing process which is more economical in terms of time, materials, and processes. According to the National Culture Policy by the National Department of Culture and Arts has outlined that the conservation program is important for the development of Malaysia and the Malaysian identity is upheld to improve socio-economic and political development. In many countries in the world including Malaysia has its cultural heritage as well as a distinct identity [14].

Problem statement

Rebab is a traditional musical instrument that belongs to a small class of chordophone instruments that are less common in Southeast Asian music ensemble [1], [15]. Some of the factors that justify the assertion are listed below.

i. The process of making Rebab is still using the traditional process. Makers are still use a lot of traditional processes, such as shaping, dredging and carving.
ii. No attempt on using modern production method.
iii. Long process and lack of preferred materials availability.
iv. Fabrication processes and technique acquired only through apprenticeship.

This will become a part of the preservation program to sustain the popularity of Malaysian culture and identity as stated in the National Culture Policy by the National Department for Culture and Arts. Experts still use a lot of traditional processes, such as carving and shaping. There is no attempt in producing Rebab using modern production methods. Another reason that the process is incomprehensible is because of the technique acquired only through apprenticeship. New technique with a modern fabrication process that also suitable for mass production. Therefore, Rebab instrument will easily produce, commercialized and marketed globally.

This research is the first move before establishing other development of indigenous or culture products through a new ground of industrial design and development approach. software and other IOT techniques and resources. It is very difficult to produce ‘Kelantan's Rebab’ in the 21st century. It is because of the difficulty in getting raw materials. The production is very limited and in addition to the lack of Kelantan's Rebab player in Malaysia generally. Chordophone musical instruments are less welcome in the music ensemble in Southeast Asia. While the

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instruments of the membranophone group and idiophone are even more attention in this archipelago region. The lack of KR maker is one of the factors of reduction of skilled Rebab makers and its expenditure also decreases. Another factor is the development of modern technology that creates more users than designers or craftsmen in the manufacture of traditional musical instruments. The researcher sees the need to study the alternatives to the KR manufacturing process which is more economical in terms of time, materials, and processes. This will become a part of the preservation program to sustain the popularity of Malaysian culture and identity as stated in the National Culture Policy by the National Department for Culture and Arts. Experts still use a lot of traditional processes, such as carving and shaping.

There is no attempt in producing Rebab using modern production methods. Another reason that the process is incomprehensible is because of the technique acquired only through apprenticeship. The main objective of this research is to propose a new process in making Rebab musical instruments through an industrial design approach. New technique with a modern fabrication process that also suitable for mass production. Therefore, Rebab instrument will easily produce, commercialized and marketed globally. This research is the first move before establishing other development of indigenous or culture products through a new ground of industrial design and development approach. This research is planned to get support from application software and other IOT techniques and resources.

Objective

The first objective of this research is to identify the new processes of producing KR and analyzing possible fabrication methods through industrial design approach. The second objective is to propose an alternative way of producing KR with substitute materials and processes. Finally, to validate the performance, materials and processes of the new improvised version of traditional KR.

Methodology

From the objectives the researchers have outlined the methodology in order to obtain data for analysis. These include observation at the selected research sites. All measurements of the KR were taken from the observation. The KR player had also described the materials and processes used in its production. Thus, the researchers start to figure out alternative ways in producing one prototype. Both methods and materials are reworked in order to achieve the most recent processes that are simpler and more practical. Since this analysis would not necessitate large-scale production, manufacturing costs are not taken into account. Finally, this prototype would be shown to a skilled player of this musical instrument.

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Figure 1.ZulkifliYussoff the player of Kelantan's Rebab in Kota Bharu, Kelantan

Figure 1 shows one of few active players of KR in Kelantan. He demonstrates how to play and highlighted the key components of a KR. This was part of the process of obtaining current fabrication methods, components, and processes from Kelantan's Rebab experts through evaluation and interviews using a qualitative research application. It is critical to begin with scholarly research or library research that includes literature reviews of published works, especially in relation to the root of Rebab. The following move was to build and evaluate new materials and processes using the industrial design method as well as mechanical design. Finally, expert approval of the enhanced KR is needed to explain the findings.

Figure 2. The main body of KR before finishing and assembly

Figure 2 depicts several major bodies of KR that have not been finished. They were carved from solid wood into a concave shape.

3D modelling software is now needed for all forms of product design and production activities. It is very simple, concise, accurate and time-saving. Prior to beginning the prototype, the researcher produced a 3D model of the measurements acquired during the observation.

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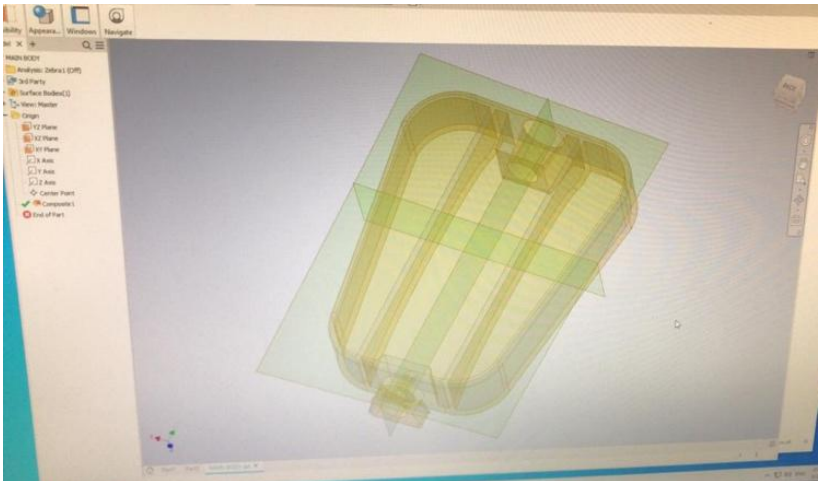

Figure 3. The 3D modeling of the KR main body

Figures 3 and 4 demonstrate the planning for the prototype, which is creating a 3D model using Solidworks and Autodesk Inventor tools. Several issues have arisen during the prototyping phase. Among them is the precarious and solid state of the substance for critical activities such as the KR's main backbone. This issue was solved by using stainless steel rod. Epoxy resin and ABS are two other materials that have been used.

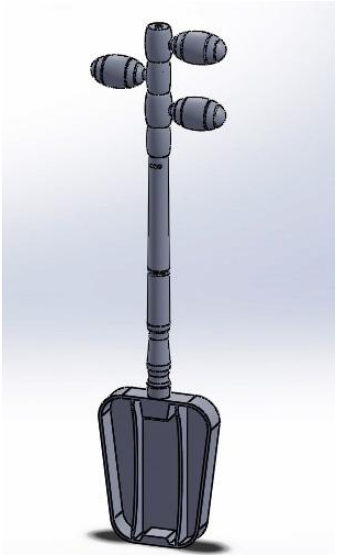

Figure 4. 3D view of the expected improvisation from 3D modeling software

Results and Discussion

The prototype was created manually. The epoxy resin casting process was also used. Aside from that, fibre reinforce was used to build the main body.

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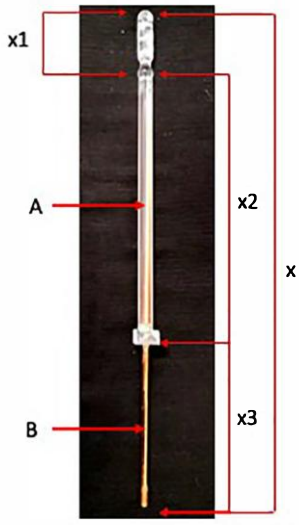
Table 1.Images with elevation views of the final prototype

FRONT VIEW	SIDE VIEW	BACK VIEW

Table 2. The description of the main shaft of KR prototype

	Description	Materials & Process	size
	The main shaft of rebab is the long thin shaft that the player's left hand can press down the strings when playing. String can be pressed at certain points to get certain notes. At the end of the shaft it has the tail end where all the strings end. It is home to the plastic bit used to tune the rebab.	Part A: Material: Epoxy resin (hard) Process: Molded plastic resin Part B: Material: Copper Rod (10mm) Process: Saw cut	X : 88cm X1 : 13cm X1 : 49cm X1 : 26cm

Tables 1 and 2 depict the appearance and key components of the produced prototype. In general, the prototype developed demonstrates that modern processes and materials do not obstruct the development of conventional musical instruments. Researchers could determine that the scale and proportions must not vary significantly from the original.The shaft is made of copper rod and is constructed to endure the stretching of the strings as determined by the tuner.

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Table 3. String tuner for the new KR prototype

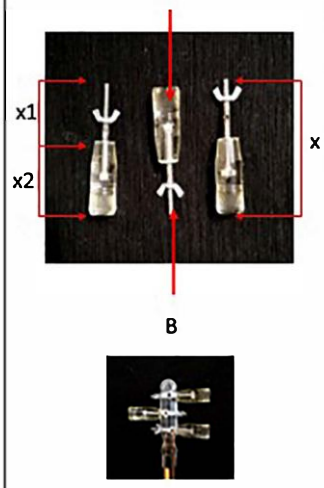
	Description	Materials & Process	size
	Name : Tuner 1. This is the tuner of rebab. 2. These tuner bits can be twisted by the player to tune the strings. The 'main' part of the screw is fixed to a peg from which the string is wrapped. When it turns, the pitch will change.	Part A: Material: Epoxy Resin (hard) Process: Molded Plastic resin Part B: Material : Stainless steel screws	X : 10.5cm X1 : 6 cm X1 : 4.5cm

Table 3 reveals that the string tuners were also made with epoxy resin and a stainless-steel screw embedded within the tuner body. As compared to the original tuner made of wood, the work of the plastic tuner seems to be flawless. It may also be formed in accordance with the original concept if the creator wishes to highlight conventional characteristics. Floral motif carvings and *makyung*performance traditions found on the original KR are readily transferable to new materials.

Table 4. The description of tailpiece for the new KR prototype

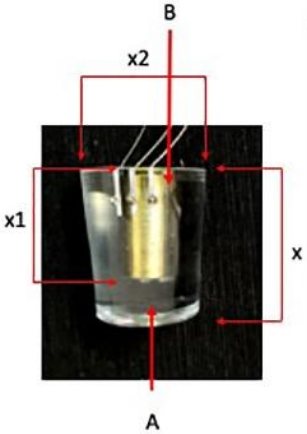
	Description	Materials & Process	size
	Name : **Tailpiece** Function : 1. as a tailpiece of rebad 2. The strings need to be anchored at tailpiece	Part A : Material : Epoxy resin (Hard) Process : Molded plastic resin Part B : Material : Copper Bar (10 mm) Process : -	X : 7 cm X1 : 5 cm X2 : 6.5 cm

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Table 5. The main body for the new KR prototype

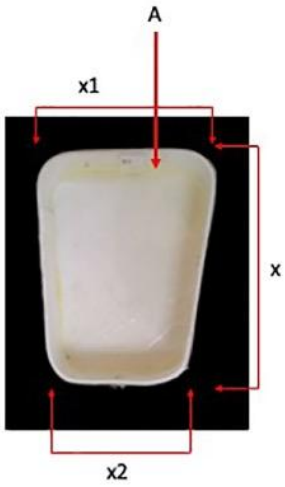
	Description	Materials & Process	size
	Name : Body Function : 1. as a main body of rebad 2. The body of the rebad is the square shaped piece of the rebad that holds several other parts. There are many types of body styles for rebad, and have much verity and different sizes.	Part A : Material : Epoxy resin (Hard) Fibre glass PVC Bord Process : Molded plastic resin	X : 24.5 cm X1 : 19 cm X2 : 14 cm

Table 4 displays the tailpiece fabrication details for the KR prototype. It is made of moulded epoxy resin as well. This is necessary so that the player can monitor the rotation of the KR and keep it focused in one place. Table 5 depicts the most significant component of KR, which is the main body. It's made of fibre glass and epoxy resin on a concaved type of mould. To substitute the leather or inner portion of the cow intestine, this body would be covered with a thin (2-3mm) Polyethylene terephthalate (PET) membrane. This type of membrane is widely used in the manufacture of modern drumheads. In order to capture the sound of the strings, it must be mounted tightly and extended.

Conclusion

Based on the objectives of this study, the researchers may conclude that the KR is mass-manufacturable using readily available materials. All epoxy resin components should be substituted with injection moulded plastic parts to accommodate the mass manufacturing process. Any of the procedures will also require additional secondary processes to finish the detailing sections. As a result of this KR transformation and commercialization programme, excellent returns can be obtained in terms of offering new goods to the consumer as well as raising awareness of local arts and culture. This is what the outside world sees and not something that is commonly seen by outside tourists.However, the researchers conclude that public understanding of traditional arts and culture remains low due to a lack of visibility to the whole community and as well as the younger generation.This is also expected to boost profits for art activists as well as the local manufacturing sector. As long as there is no attempt taken in this direction, art will be buried and extinct.

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