UNIVERSITI PUTRA MALAYSIA

PRESERVATION OF GAMELAN MELAYU RECORDINGS THROUGH SOUND ENGINEERING

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

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DEDICATION

For my family.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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Sound or audio engineering is a branch of the engineering field which involves the process of recording sound and reproducing it by various means, as well as storing it so that it can be reproduced later. Known as sound or audio engineers, these trained professionals work in a variety of sound production fields and expert in recording methods. They can be instrumental to implement the affordable technologies and technical process to distribute the audio data so it will accessible to future generation. The current role of these engineers not only to perform or limited to recording session but they create metadata for archiving and preservation for future needs. Currently, product sleeves of ethnography recordings represent no technical elements of how traditional music recordings are produced. The product details focus only to some extent on historical elements and musical notation. To an audio archivist, declaring what devices are in a recording is unconnected for preservation data. Apart from the format, the sleeved design, technical specification is essential to other social scientists such as audio engineer and field recordist of the future. Qualitative methods were used to study and implemented in this research to gain the data collection, the variables were measured on nominal scale, enables classification of individuals, objects or response based on a common and shared property of characteristic that represent the topic of the research project. The aim of the research is to capture optimum dynamic range of the sound that would not alter the tonality, timbre and harmonic of the sound and further applying a suitable information storage for the metadata to be preserve or archived for future accessing and reproduction. The findings of the research are used as informative and guideline for the target sample in current and future works in the field or industry they engage respectively.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PEMELIHARAAN BUNYI GAMELAN MELAYU MELALUI KAEDAH KEJURUTERAAN BUNYI

Oleh

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Kejuruteraan audio atau bunyi adalah salah satu cabang bidang kejuruteraan sonik yang melibatkan, proses rakaman bunyi, penyimpanan rakaman untuk tujuan pengarkiban dan proses penghasilan semula melalui pelbagai kaedah, agar ianya dapat gunapakai kelak. Jurutera audio atau bunyi, merupakan professional terlatih dalam bidang produksi audio serta pakar dalam pelbagai kaedah rakaman. Mereka dapat berperanan untuk melaksanakan proses teknikal dengan teknologi yang terjangkau melalui pengayaan informasi data audio untuk generasi akan datang. Peranan jurutera audio ini bukan sahaja melaksana atau terhad kepada sesi rakaman, tetapi mereka berperanan membentuk metadata untuk tujuan pengarkiban dan pemeliharaan untuk keperluan masa depan. Pada masa ini, keterangan mengenai produk rakaman etnografi yang terdapat di kulit album tidak mewakili unsur teknikal bagaimana rakaman muzik tradisional dihasilkan. Maklumat produk yang terdapat di kulit album hanya tertumpu pada elemen sejarah dan notasi muzik. Pengisytiharaan perihal peranti yang digunapakai didalam produk sesuatu rakaman tidak mencukupi untuk tujuan pemeliharaan data audio. Selain format serta reka bentuk kulit album, informasi perihal spesifikasi teknikal merupakan tunjang utama untuk ahli saintis sosial seperti jurutera audio serta jurutera rakaman audio lapangan. Objektif kajian ini adalah untuk memperolehi jangkauan dinamik bunyi yang optimum dimana ianya tidak akan membawa perubahan kepada nada, timbre, harmonik melalui mengaplikasikan simpanan maklumat metadata untuk diarkibkan demi kemudahan akses dan penghasilan semua pada masa akan datang. Kaedah kualitatif digunakan untuk mengkaji dan dilaksanakan dalam kajian ini untuk mendapatkan pengumpulan data, perbezaanya diukur pada skala nominal, memungkinkan pengelasan individu, objek atau tindak balas berdasarkan sifat umum dan sifat bersama yang mewakili topik projek penyelidikan. Penemuan dalam penyelidikan ini digunakan sebagai maklumat dan panduan untuk sampel sasaran dalam kerja semasa dan masa hadapan di dalam bidang atau industri yang mereka terlibat masing-masing.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Sound or audio engineering is a branch of the engineering field which involves the process of recording sound and reproducing it by various means, as well as storing it so that it can be reproduced later. At present, traditional music ensemble like Gamelan Melayu recordings contain cultural evidence in a form of audio or visual whom are at risk such as content risk (orals, writings) and physical risk (machines, storage, natural disaster) happens to the materials. It is important to formalise a guideline of recording techniques and productions in preservation at this digital era and the information on technique becomes a reference for other social scientist such as sound engineer, archivist, field recordist, musician's future use and which does not alter its originality. The aim of the research is to capture optimum dynamic range of the sound and that would not alter the tonality, timbre and harmonic of the sound and further applying a suitable information storage for the metadata to be preserve or archived for future accessing and reproduction. This serves as the guiding principle for archivist to determine the needs of its current users and to foresee the needs of future users to the extent possible, while balancing those needs against the state of the archive and its contents (IASA TC-03, 2017: 2).

1.2 Background of the Study

The study of ethnomusicology[1] shows us why, and how, human beings are musically capable to create, perform, physically and emotionally to organized sounds. In the fieldwork, the main criteria of the work will be documentation of the musical performances and musical events in the form of field notes and in audio and video recordings (Rice, 2014: 1-37). The fieldworks outcome is related to the observations and interpretation of the researcher's experiences. Details from the documentation carry significant importance from audio visual perspective.

Various recordings of traditional instruments collected via field recordings, or confined surroundings such as in a room, a hall, hut, house, or in a conventional recording studio, sound or music will vary each other when compared in terms of dynamic range, stereo imaging and quality of recording. This indicates that the quality of this audio recording is seen to depend on both the contextual and the technical aspects. It is the view as important information in audio preservation as well as information about how the audio content was made. This serves the task of an audio archivist, where the provision of information in relation to the faculty of sound recording preservation both technical and spatial from one to other sustainably accessible information that does not compromise

[1] Ethnomusicology: The study of the music of different cultures, especially non-Western ones.

sound and/or visual content, or any other information related to it (IASA TC-03, 2017: 2).

Viewed from technical procedure on sound recording and engineering of traditional music ensemble in Malaysia are scarce. Most often, the historical part of it were given much attention by the researchers, but details on the technical specification of audio recording and reproduction of these early recordings are unavailable and it is to be regarded as not important at all to most people. This is evident in the case of current or historical manuscript, books and logs, the centred focus explanation or experience (of the writers) will be on the traditional instrument's characteristics and sound behaviours, accompanying performance (dance, theatre play) and musical notation, thus leaving the gap of the sound engineering approach perspectives. Most often the recordings and productions disparities occur when technical equipment and production techniques are limited, especially in microphone techniques and signal processing of the said the sound. Technical specifications and sound engineering will be crucial in development of the metadata enrichment for preservation and archiving purpose, this will enhance the outcome and documentation to achieve the purpose. Preservation and archiving should start from the moment the sound engineering specifications to the recordings is applied and the information is gathered. The researcher will explain further in next topic 1.3 Statement of Problem.

Hence, the researcher would like to grow technical information on the specification of how to record Gamelan Melayu in a form of illustration and brief descriptions as part of metadata as means of preservation. The research will show and analyse selected recordings of the Gamelan Melayu from different archived recordings to show the differences that occur in dynamic range, stereo imaging and quality of recordings. From these analyses, the research could give solutions, advices, methods or techniques that could be used to improvise the sound preservation of Gamelan Melayu with help of conducted recording and production done by the researcher. With the help of illustration and brief descriptions of microphone selections with different polar patterns and approach for mixing master of the said recording, we could achieve a desirable outcome that could be standardised in future endeavours of capturing the sound of Gamelan Melayu. These illustration and brief descriptions are recommended to be embedded together with final materials as data for reference for later reproduction in future.

At present, the Arkib Negara Malaysia[2] (National Archive of Malaysia) have stated records are very important as evidence and reference material that can be used by the government, researchers and future generation. It will be a loss to the nation if they are not well preserved. They have divided the agents of destruction to four factors, which are physical, biological, chemical and human (ANM.SAPD.02/2010 &

[2] Arkib Negara Malaysia (National Archive of Malaysia): An agency under purview of Kementerian Pelancongan, Seni dan Budaya Malaysia – MOTAC (Ministry of Tourism, Arts and Culture Malaysia). Established in 1957 as Public Records Office before changing to current name in 1963. The agency responsibility in repository of government data, information and records only. Aside that, they assist other government agency in record keeping training and management of audio visual archive.

ANM.SAPD.08/2010). Cultural evidence in a form of audiovisual (magnetic tape, vinyl's, audio cassette, compact disc [CD's]) that are at risk can be divided to two category, content risk and physical risk, refer Table 1.1.

Table 1.1 : Content Risk and Physical Risk

Content Risk	**Physical Risk**
Writings	Malfunction of Devices
Communication	Outdated Technology
Human Errors	Natural Disaster

The internal physics and chemistry of audiovisual carriers largely very vulnerable to inappropriate temperature and humidity, they are expose to atmospheric pollution, mould and various types of decay and distortion which affects their physical integrity and the quality of the image and sound information they contain. As some have few decades of shelf life or less and others durable and withstand the time (Edmondson, 2004: 45). In brief we could see the obstacles in Table 1.2.

Table 1.2 : Preservation Obstacles

Terms	**Descriptions**
1. Obsolete Replay Devices	Technology advancement in equipment.
2. Sticky Shed Syndrome (Medium)	Deterioration of the binders in a magnetic tape.
3. CD Rot or Bronzing	The outer coating of the CD erodes.
4. Natural Disaster	Floods, tsunami, landslides occur to the materials.
5. Human Errors	War, accidents occur to the materials.

The aim of preservation is to provide our successors and their clients with as much of the information contained in our holdings as it is possible to achieve in our professional working environment (IASA TC-04, 2011: 6). Environment is where the nature of the sound behaves in a variety of acoustics[3] contexts and giving us the understanding of the musical instrument's operations and the interaction of sound with our hearing (Howard & Angus, 2006: 1). This definition highlights archive responsibility to provide access to the users, both current and future and to balance those needs against the conditions and resources of the archive. These ensure the aim of the preservation has access to the audio content of the collection is available to approved users, current and future, without undue threat or damage to the audio item (IASA TC-04, 2011: 6).

[3] Acoustics: The study of soundwave motion and sound behaviour, includes the study of various materials and their effect on the character of sound and their surrounding acoustics environment.

Most often, the specification or information with regards on how to migrate these recordings to a stable condition is perceivably scarce or intangible. The Library of Congress[4] (USA) for instance has published articles on a variety of facets of sound preservation, cataloguing, and standardization, among other topics, categorized by discipline and area of study. Unfortunately, the adaptions of these technique and information are left out most often in the preservation works. The research tends to gather and combine these information's and produce step by step guidelines. With initiative of association like AES[5], ARSC[6], IASA[7] and SEAPAVAA[8], archivist from all round the world could now refer to archiving standards since mid-1960's. Moreover, technical specifications and characteristics help determine the quality and reliability of recordings, for example, hardware and formats such as microphone, recording and mixing console, recording machine, audio formats, materials, tape speed, and types (IASA TC-04, 2011: 86). Unfortunately, but not many on the inclusion of these devices and equipment's used to accompany the final material. Thus, create an unguided decision in re-creation of the said traditional music in future.

> The totality of things necessary to ensure the permanent accessibility – forever - of an audio-visual document with the maximum integrity (Edmondson, 2004: 20).

Materials that available from end products such as vinyl's, tape or even the digitization of an analogue recording that were made into a compact disc, contain only the audio itself without and are at times minimal information in regard to the technical specification for future reference. As mention in previous paragraph, technical specification refers to microphone techniques and placement (position), recording methods, mixing procedure and as well final mastering. This includes minimum requirements of equipment's, hardware's and software's that used in the original recordings or reproduction of the works. With absence of this information's, the materials become useless as a guide or reference for other social scientists such as sound engineers, archivists, field recordists, musicians as to no proper information found in these recording that can benefit to these scientists for future use.

An example of this is the preservation is discussed by Henry (2017) in IASA Conference 2017, where by a current project by CREM-CNRS[9] at the University of Nanterre to manage the sound archive of the former Paris Musée de l'Homme. The collection focused

[4] Library of Congress: Research library and de facto national library of United States.
[5] AES: Audio Engineering Society, is an international professional body devoted to audio technology, founded in 1948 in United States.
[6] ARSC: Association for Recorded Sound Collections, is a non-profit organization dedicated to the preservation and study of sound recordings.
[7] IASA: International Association of Sound and Audiovisual Archives, is a professional association concerned with the care, access and long-term preservation of the world's sound and moving image heritage.
[8] SEAPAVAA: Southeast Asia-Pacific Audio Visual Archives Association, is an association of organizations and individuals involved in the development of audiovisual archiving in Southeast Asia and the Pacific.
[9] CREM-CNRS: Centre de Recherche en Ethnomusicologie, is an organisation gathers sound archives from commercial and field recordings of music and oral traditions from around the world, from 1900 to the present.

on ethnomusicology includes several thousands of 78 rpm[10] records and LPs[11], include photography's and paper documents such as commercial catalogues of record labels from the late 1920's to the 1960's. Upon receiving from private collectors or donated by well-wisher, these records are cleaned, indexed and digitized. As of today, they are 21,000 recordings available for listening on free access on CREM website portal. Part of the preservation works include the catalogue and pictures that shows about the record and identifying technical information that could show past recordings, how they were recorded and hardware's that were used. In past time, these information were added for the listeners to experience how the recordist were doing the recordings with the available equipment's and geographical environment. Unfortunately, this practice now discontinues in our current music recordings sleeve as it is become less important for others. With emerging of music streaming platforms in the internet as new source of entertainment, physical copies production is declining slowly. A notable example of Henry works is a theme call 'Disquaires de Paris' that tries to tell a piece of their story by offering data for each of the visual testimonials in the history of record industry in Paris since 19th century. In his personal blog site https://ceintsdebakelite.com, Henry trace recording session visuals from the 78 rpm records from labels like Gramophone, Odeon, Pathé and APGA for identify the techniques or production methods that were applied for the records (refer Figure 1.1 & 1.2).

In Malaysia, the responsibility of audio visual preservation and archiving falls under Kementerian Pelancongan, Seni dan Budaya Malaysia - MOTAC[12] (Ministry of Tourism, Arts and Culture Malaysia), the agency or department involve is National Archive of Malaysia, Jabatan Kebudayaan dan Kesenian Negara - JKKN[13] (National Department for Culture and Arts) and Jabatan Muzium Negara[14] (Department of Museums Malaysia).

[10] 78 rpm: Made between 1898 to late 1950s, the vinyl made or coated from different materials depending on the manufactures but shellac become the standard. Playing at speed of 78 revolutions per minute. Comes in various diameter in early stage of development, the most common is 12inch and have 3 to 5 minutes play at each side.

[11] LP: LP stand for 'Long Play' vinyl, introduced by Columbia label in 1948 and made from polyvinyl chloride which became common manufacturing standard. Playing at speed of 33⅓ revolutions per minute, comes in 12inch diameter and have capacity of playing about 20 minutes each side. LPs taken over by cartridge, cassette and eventually CDs.

[12] MOTAC: Ministry of Tourism, Arts and Culture Malaysia, is a ministry of the Government of Malaysia that is responsible for tourism, arts and culture in the country, http://www.motour.gov.my/en/profile/departments-agencies

[13] JKKN: Jabatan Kebudayaan dan Kesenian Negara (National Department for Culture and Arts) is government department under MOTAC. The responsibility of the department is to safe guard, protect and develop the multiracial cultures in Malaysia. Department covers variety of section such as music instruments, music, dance, theatre, traditional costumes, traditional games and customs.

[14]Jabatan Muzium Negara: Department of Museums Malaysia, is a department under purview of MOTAC. The major role of the department work is collecting, conserving and preserving the nation's history, culture and nature. The department maintains various collections for conservation, research and education on the multicultural artefacts and important specimens found in the country.

Figure 1.1 : A visit at the Pathé factory in 1907
(Source: https://ceintsdebakelite.com/category/browsing-gallica/)

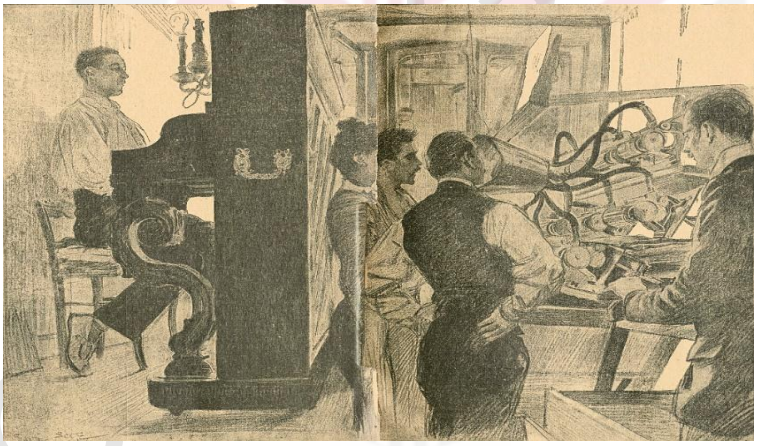

Figure 1.2 : Recording Faust for Pathé in 1899
(Source: https://ceintsdebakelite.com/category/browsing-gallica/)

On the other hand, is the Radio Televisyen Malaysia - RTM[15] and Perbadanan Kemajuan Filem Nasional Malaysia-FINAS[16] (National Film Development Corporation Malaysia) under Kementerian Komunikasi & Multimedia Malaysia - KKMM[17] (Ministry of Communications and Multimedia Malaysia). Through MyCreative[18] digitalisation project, a system called Media Asset Management System-MAMS was launch to integrate few departments like National Archive Malaysia, RTM, FINAS and few other departments in keeping all audio-visual data information. Unfortunately, due to maintenance cost over the years, the system was abandoned by most of the departments and become absolute. Currently, National Archive Malaysia restructuring back MAMS to retrieve back all the information that been ingested in the system for better solution in upcoming years. Meanwhile JKKN through implementation of National Culture Policy (1970) helps in strengthen national unity by enrich and enhance the culture arts. One of the key areas is music, whereby they work in conserving, preserving and developing the traditional music by cataloguing the music and production of the album by their own. From the researcher findings, the current audio-visual preservation is sole work of each agencies and departments without any centralized coordination. These creates a gap of information and standardization of data across the agencies or departments for reference. This issue was addressed by Henry at the 48th International Conference IASA in Berlin September 2017 in creating standard operation procedures (SOP), the researcher urges the government to undertake appropriate measure such as widen the adoptions of IASA TC-03 and IASA TC-04 for future development of preservation in our country.

What is motivating about this study is that the traditional music recording techniques approach by the local audio engineers is seen using *'popular music'* recording techniques. This is because there was no technical information and specification with regard to the recording process to be part of the audio-visual preservation document. Without references, or perhaps a reference of past recording to our knowledge been shorn of, technical methods of popular music have been adapted into traditional music ensemble in Malaysia (further explanation in Chapter 3) by the local engineers hence creating imitative in originality of sound. According to Shuker, popular music refers to the way of making, disseminating and consuming music; the economic and technological practise that link to these processes which are recordings and sound images (Shuker, 2013: 3). Popular music can be defined as a diverse array of music styles in relationship to the audience from 1950's rock and roll to current contemporary dance music (Bennet, 2001: xi). Further to add on, new recordings formats and modes of transmissions and dissemination does alter the process of musical productions (Shuker, 2013: 26). Waksman said in broad term, technology have affected the popular music at all levels, equally affecting the spheres of performance and listening, production and consumption (Bennet & Waksman (ed), 2015: 509). Adorno (as cited in Longhurst & Bogdanović,

[15] RTM: The British colonial established Radio Malaya on 1st April 1946, upon independence and Malaysia was formed on 16th September 1963 it was renamed to Radio Malaysia. Broadcasting of television started after that, on 1969, radio and television are merged and known as RTM.

[16] FINAS: Central government agency for the film industry of Malaysia. Under the purview of KKMM.

[17] KKMM: Ministry of Communications and Multimedia Malaysia, is a ministry of the Government of Malaysia that is responsible for broadcasting, multimedia, telecommunications, communications, content and personal data protection, https://www.kkmm.gov.my/index.php/en/directory-and-contact-us/direktori-jabatan-agensi

[18] MyCreative: MyCreative Ventures Sdn. Bhd. is a Government investment arm launched 2012 to spearhead Malaysian creative industry via strategic and innovative funding through debt or equity investments in Malaysian creative companies.

2014: 3) said that popular music is a part of the culture industry, where popular music is standardized from the type of songs, the songs themselves, and parts of songs. To summarise, popular music is a general term to wide variety of musical genres (rock, dance, blues, jazz, hip hop and so on) that attract large segment of the audiences and different method music productions in recordings. In this regard, emphasis of musical instruments was always associated with the genre. Isolated dry (without spatial effect such as reverberation) kick drum, bass, and multitrack recording is the conventional process music productions which mostly done on popular music.

This research will serve as a preservation of information that includes technical specification of audio recording and reproduction as 'metadata enrichment', as well as starting point for other musical recordings of traditional instruments to preserve their technical specification as means of archiving. Metadata is definitions and descriptions of the data. According to (Lacinak, 2014: 1) the president of AVP Preserve a Media Archiving & Data Management Consultants, has written metadata is an integral component of digital preservation and an essential part of the digital object. These files without any appropriate metadata are not understandable, interpretable, or manageable. Thus effectively, there is no preservation or meaningful access without metadata.

> Audio engineers are urged to take community responsibility with the help of the digitisation technology, to preserve our heritage musical and folk songs to be presented to the future generation. Thus, the audio engineers also can develop metadata standards for archiving (Hart, 2001: 667-670).

Hart urges the audio engineers to take social responsibility with the help of the digitization technology, to preserve our heritage musical, cultural and folk songs to be presented to the next future generation. We have been doing it over 110 years, started with Edison wax cylinder, later stage to tin, wire, glass, acetate and magnetic tape. As this recording medium poses its own problems, the recorded material will lead to decay and rot. The audio engineers are the tool to preservation who can implement the affordable technologies and technical process to distribute the music so it will accessible to the future generation. On the other hand, Hart suggest the audio engineers can help to develop metadata standards for archiving for the preservation purpose. Adoptions of popular music technique such as microphone technique in band recordings such close miking for drums, and adding unnecessary signal processing such as compression in a way alter the frequency and dynamic of the traditional music. If these engineers could provide suitable techniques and final production methods metadata, the authenticity of the traditional music could be preserved or archived much systematically.

This study will document the sound of Gamelan Melayu which is regarded as the sonic[19] transmission of high intangible heritage values in Malaysia. The researcher will adopt guidelines suggested by international organisations for preservation and archiving. Using these guidelines, the research will use selected microphone and production

[19] Sonic: Nature of sound or sound waves.

techniques to capture the sound, mixing and document the findings in form of text and visual. The outcome and analysis of the research could be used as reference for other social scientists such as sound engineers, archivists, field recordists, and musicians. These will be discussed and elaborated further in Chapter 3 and 4.

1.3 Statement of the Problem

Information concerning the technical aspect of production, and reproduction of audio recording process of the traditional ensemble in Malaysia in the past (microphone, mixer, recording machine, audio formats, materials, tape speed and types) very scarce. Chan (1998), in his research about folk songs conducted in Ulu Tembeling, said it is important to document these valuable musical resources as these resources could be applied for historical study, cultural study, musical study, music composition, and music education. The change in villager's lifestyle with the adaption of modern living, traditional folk songs are no longer actively practiced as in the past. Referring to this, the documentation should also include the technical aspect of the production from the hardware and formats used for the recordings, refer to Figure 1.3 and 1.4, Sape Volume 7, 2004 (LUH CD 98031) where the recording of the instrument's music is very less informative and blank. At some time, we only have the musical notes as references but not the recordings formats or technical notes that can be used as a guide for reproduction later. Musib (2015), stated we should not only give importance to capturing sound of the core source but also important in the context in which the instruments are played to create preservation tool to provide the choice of receptive perspectives.

Figure 1.3 & 1.4, sleeve cover picture depicts an example of how most of the data are missing or important information is missing when traditional music is recorded. Reference to the Sape[20] recording technique instrumentation, musical notes, and hardware should have been provided together as guidance for future referral for reproduction. The CD Covers could be used as an information booklet or source to link for further information.

[20] Sape: It is a traditional musical instrument from Sarawak, has strings and belong to lute family.

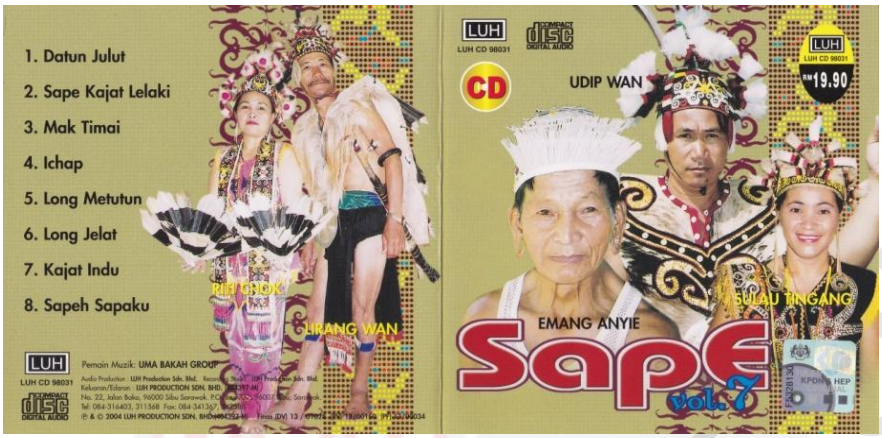

Figure 1.3 : Sape Volume 7, 2004 Front Cover and Track List (LUH CD 98031)

Figure 1.4 : Sape Volume 7, 2004 Internal Inlay (LUH CD 98031)

As we can see in Figure 1.5, the recordings have taken place in recording studio, how the gamelan instruments were placed and recorded, how acoustically the environment suited the recording is less informative. On the other hand, Figure 1.5 depicts an example of the history of the Gamelan Melayu, track list, musician credits, and engineers. A good initial initiative headed by Muzium Negeri Terengganu[21] (Terengganu State Museum) and Jabatan Pelancongan Negeri Terengganu[22] (Terengganu Tourism Board), but lack

[21] Muzium Negeri Terengganu: Terengganu Sate Museum known among the locals as Muzium Losong is in Kuala Terengganu, Terengganu. One of the largest museums in Malaysia with multiple halls. Established in year 1976, the building in Bukit Losong was open in 1996 over 27 acres of land. The state museum takes responsibility of Terengganu customs, traditional and culture.

[22] Jabatan Pelancongan Negeri Terengganu: Terengganu Tourism Board to promote the state tourism and culture awareness as attractions for foreign visitors. The board work together with Terengganu State Government Secretary's Performing Arts Group (SUKTRA).

in the information of the instrument's introduction and assembly of the set. Technical details are scarce for the reproduction works in the future.

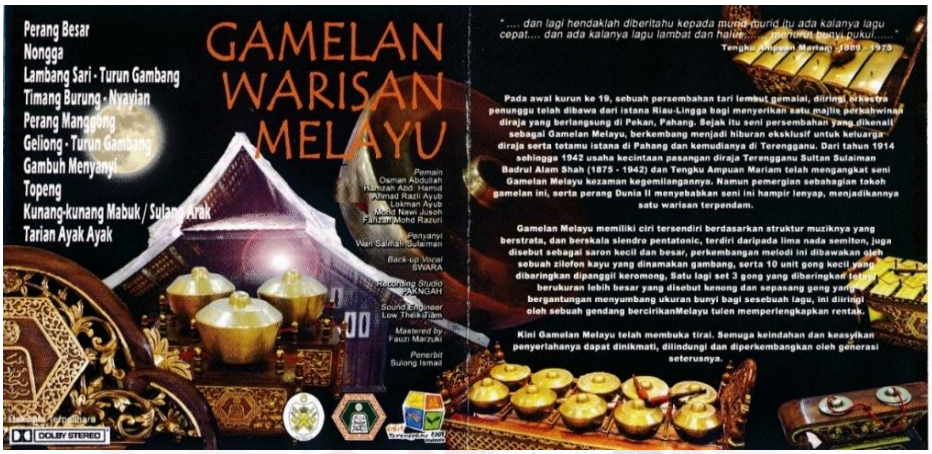

Figure 1.5 : Gamelan Warisan Melayu, 2008

Figure 1.6 shows a traditional instrument called Sarod[23] in the CD cover and the history of it. Figure 1.7 explain the original recordings were done in the 1960s, later was transferred as digital into a CD. This sleeve is a good example to start with metadata preservation, explaining the recording process but not visually showing how the recording was conducted. The researcher would like to add in the missing information to be part of the process.

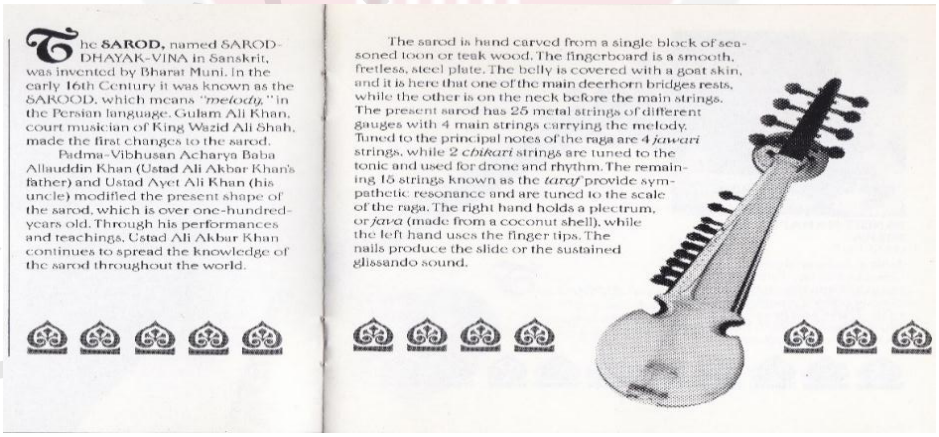

Figure 1.6 : AMMP Ustad Ali Akbar Khan Signature Series Vol.1, 1990 Inlay 02 (CD 9001)

[23] Sarod: Is a plucked, stringed instrument of northern India.

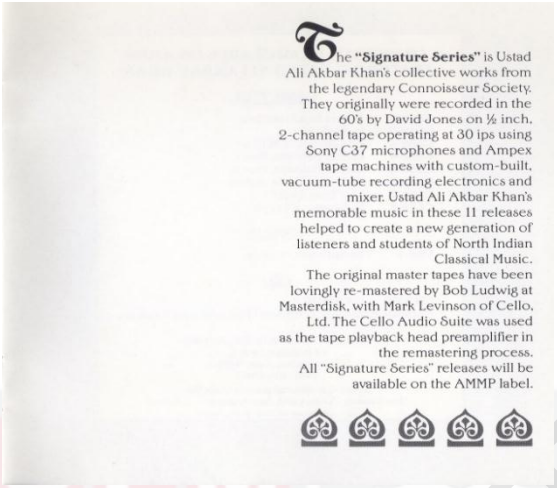

Figure 1.7 : AMMP Ustad Ali Akbar Khan Signature Series Vol.1, 1990 Inlay 05 (CD 9001)

Therefore, non-standardization of sound recording and reproduction of the traditional music created lower quality output or final product. Sound quality can be in physical, technical terms or in perceptual terms, the physical term is measured by characteristics of audio devices, transmission channels or signals. Perceptual terms relate how humans judge and interpret the sound, the goal is to find better ways of measurement of the said audio signals and perceived as quality (Rumsey & McCormick, 2014: 581-582). This aspect causes the recordings to lose key elements such as tonality, timbre, harmonics and sonic footprint of the gamelan music. Shiver (2003), in his convention paper, described we may understand the present status of the Malay traditional music by looking at cultural milieu that which shifting to westernization as in fusion. Non-original traditional repertoire adapted or blended (fusion) to suit (created) into the current trend-setting music or songs. This contributes directly to the indigenous music culture to be obscured and openly being polluted from imported media content. The gamelan instruments and other local instruments which most often handcrafted using traditional techniques and not mass produce are getting lost, thus the music is not mass consume.

Improper applications of microphone techniques, placement, and type (patterns) normally use for musical band and groups are applied without taking consideration of the traditional instruments sound characteristics. Lewis (2011), explains that microphone practice is instrumental in creating the characteristic sound of a track. While every step in the process of tracking and mixing impacts the resulting sound of a recording, some of the most readily noticeable features of a completed track are the audible results of microphone practice. This is particularly true for music types that resist "conspicuous" signal processing methods in favour of more veridical production values.

> There are several distinct aspects of microphone practice that we can examine individually in order to best elucidate the audible consequences of each practice. However, all of the examined aspects of microphone practice are heard by a listener at once while auditioning a track, and so these aspects work together in tandem to create part of that track's sonic character. Because of this, microphone choice, proximity, placement or angling – can't considered separate from the others in aspect of microphone practice (Lewis, 2011: 222).

In practice, preserving metadata of technical requirements, include information necessary to authenticate the content, such as the capture equipment used, including known software for rendering (IASA TC-03, 2017: 16). Hence, metadata should include microphone techniques used such as XY, MS, Decca Tree, Close Miking, Distant Miking, Accent Miking, and Ambient Miking. Microphone selection types, such as Condenser, Dynamic, Ribbon, and Carbon with frequency response patterns like Omnidirectional, Cardiod, Super Cardiod, Hyper-Cardiod or Bi-Directional (Figure of 8). Microphone techniques and specification will be discussed and explain further in Chapter 3.

It is important as well the documentation of the environment and surroundings for the preservation and archiving purpose. Acoustics of the recording environment will determine the effectiveness of the techniques used for the recording or the reproduction purpose. Description of the structure (indoor / outdoor) where the instruments were placed or going to be played, would be added advantage for the engineers or alike for achieving the purpose of the preservation. Sound recording reference with visual most often not available to guide the reproduction, thus creating the preservation not achieving the expected achievements and result. Increasing rate of technology changes leads to better archiving methods and management, but we need to have assured long-term viability of archiving the materials and accessibility. Planning should be made 50 years and longer, not for certain quarters. The music should store at highest sampling rate and bit depth possible. This quality will ensure to the benefit of the future generation, including conversion device, hardware or simply a software which can accessible for certain formats. Beside file formats which are crucial, metadata, or data about data, the associated data (information i.e., names, technical methods) must also be integral part of the data entry process for future references (Fleming, 2001). Metadata in definition can be acknowledge as data about data, information on the audio or sound recording is not new. Previously we have seen on the tape boxes, but over the time the practise perishes as time change and advancement in technology, the urge to know the data still there among us especially archivist. Where the user can present or in our generation, we like to reproduce that data. It is important this metadata should be archived with the audio information self to be useful to others (Lyman, 2001).

1.4 Research Question

I. How we can contribute the information of production and reproduction in the traditional instruments works?

II. How we can create standard or protocol or suggestions for sound recording and reproduction to prevent losses of key elements such as choice of microphones, recording techniques and application.

III. How enrichment of metadata serves as additional descriptive information in preservation for the social scientist? The metadata offers insights into the diverse ways in which individuals, organizations, and institutions make decisions, complete control, and respond to change.

The researcher intends to contribute in a form of documentation such as photos, visual, diagrams and schematics of the sound production and reproduction. These include high standard audio archiving and preservation methods. These further added with technical remarks in each element according to their context of use, including the individual sound of the instrument and sound perception. This includes the construction of tools such as the engineering of technical devices, work flow, modifications of recording principles and the classification of musical practice for the actual examples.

1.5 Objectives of the Study

I. To document, describe and conduct technical audio studies of traditional music ensemble recordings in Malaysia.

II. To derive sound views that support a technical specification of metadata as means of preservation in an effective way to prevent losses of key elements in sound. This includes the construction of tools such as the engineering of technical devices, work flow, modifications of recording principles and the classification of musical practice for the actual examples.

III. To explore recorded traditional music ensemble repertoire and its technical specification descriptions into an archive characterized by technical comment for recommended microphones approach for reproduction and preservation.

The technical specifications of metadata enrichment, would help sound engineer, archivist, field recordists, community member and the musicians in the field of preservation and reproduction of sound creation for future generation.

1.6 Significance of the Study

I. This study serves as a comprehensive approach to recognition, perception and construction of technical specification of audio recording and reproduction information in traditional music ensemble as metadata for preservation.

II. This study will enhance information on factors that might have an impact towards the detachment of sound materials and its technical specification of audio recording and reproduction information in traditional music ensemble.

III. Data collected leads to knowledge on factors of technical information processes within the object itself (the instruments), the way of functioning (process of sound production from diverse perspectives) and as sound culture within a community allows for the enrichment of a theory based on facts.

IV. This study will document the sound of Gamelan Melayu which is regarded as the sonic transmission of high intangible heritage values in Malaysia.

Preservation and archiving personnel, sound engineers or alike will understand the recording and mixing methods that will suit the gamelan music for better presentation rather than using popular music recording approach. Currently the Gamelan recordings are approached from modern contemporary performance, changing from traditional original performance. Landscape of the sound has change in the recording methods and outcome of the mixing.

1.7 Limitations of the Study

I. The research is limited within Gamelan Melayu practice in peninsular Malaysia only, however data or source from other regions will be used as references and guidelines to achieve the research target and aim.

II. The researcher collaborating with Gahara Gangsa[24], refer Figure 1.8, a part of collaborating group with Sahabat Gamelan Terengganu[25] under the supportive of Warisan Sari[26]. The recording and production works, were conducted at Music House 4, Music Department, Faculty of Human Ecology, UPM. Final

[24] Gahara Gangsa: Gahara Gangsa assembles talents with passion for the Gamelan Melayu from various backgrounds and education, including the Terengganu State Government Secretary's Performing Arts Group (SUKTRA), Ministry of Education Malaysia (MOE), National Academy of Arts, Culture & Heritage (ASWARA), as well as National Arts and Culture Trainer (JSBN), constituted by the National Department for Culture and Arts, Malaysia (JKKN).

[25] Sahabat Gamelan Terengganu: A group of Gamelan Melayu activist and players under patronage of Warisan Sari. The group represent Warisan Sari in performance in promoting Gamelan Melayu.

[26] Warisan Sari: A Gamelan Melayu cultural centre and a group of committed people actively involves in promoting and teaching of Gamelan Melayu music and dance based in Kampung Tok Jembal, Kuala Terengganu, Terengganu. Founded and headed by Tun Ahmad Faisal Tun Abdul Razak (Director of Terengganu Tourism Board) and his wife co-founder Madam Ariza Ibrahim. Tun Faisal is helped by his elder brother Tun Baharum Tun Abdul Razak (President of Terengganu State Tourism Association) in management of Warisan Sari.

mixing works was done at Modjo Studios, Petaling Jaya. The songs repertoire and selection are from Tengku Ampuan Mariam playlist from Istana Kolam, Terengganu (further explanation in Chapter 2).

III. The environment of the setup (Acoustic, Studio, Live Room, Close Spaces or Open Spaces). Availability of microphones types and patterns intended to use during the recording process period. Recording console that could do multi-track recordings simultaneously that could take dynamic peaks and distortions. Hardware's and software's technology that enables creativity and emulating spontaneous approach in delivering the output or outcome.

Figure 1.8 : Gamelan Melayu Gahara Gangsa Assemble
(Source: Gahara Gangsa)

1.8 Definitions and Terms Used

Here, the researcher will use following definitions and terms throughout the thesis. Many terms are sufficiently defined in the context that appeared.

Compressor: An amplifier (electrical unit that commonly used in the studio) that decrease the gain when the level of input is high, which alter the signals dynamic range.

Equalizer (EQ): A signal processing device which can alter or change the frequency response of the signal passing through it.

Dynamic: Difference between the quietest and loudest sounds when produced. Dynamic processing is the alteration to dynamic range of the sound like volume and amplitude.

Delay: Time interval of direct signal and its first reflection and subsequent repeats. A signal processing unit.

Gendang: The only membranophone category instrument in the group. The gendang has two surface which are known as gendang dua muka.

Gong: Gong is of the Idiophone category and made from bronze. In Gamelan Balinese, Java or Sudanese it comes in various sizes and names, like Gong Agung. Two primary Gongs in the Gamelan Melayu is Gong Besar and Gong Kecil.

Gambang: It has look like xylophone, but they are made from wood strips which rest and laid above wooden box which has hollow resonator in middle.

Kenong: Kenong is of the Idiophone category, it has 3 medium size gongs which has deeper height from rim to the tip, placed in wooden frame.

Keromong: Keromong is of the Idiophone category and it is made of bronze. It has 10 small gongs, placed in wooden frame by suspended on thick cords strung in a parallel arrangement and attached to the wooden rack.

Mastering (Master): Final work after mixing, to obtain optimum level of the sound for storing, broadcasting and final product (CD's, Vinyl, etc).

Metadata: Definitions and description of the data of the data.

Mixing (Mix): Balancing the frequency and amplitude of the sound for pleasant / balance listening.

Microphone Technique: Various techniques of choosing and placement of different types of microphones.

Multitrack: Simultaneously recording of multiple channels or instrument by instrument by over dub.

Noise: Interference of electrical, acoustical nature, ambient or environment.

Signal Processing: Alteration or changing of the sound wave upon recording to be added with special effects.

Sound Preservation: Safekeeping of the material for long term period or from damage.

Sound Production: Act of works or on-going sound works from start to end.

Sound Reproduction: Recreation of the sound works matching to the previous work.

Saron: Both **Saron Besar** and **Saron Kecil** is idiophone category. Made from bronze and sits on wooden box. Saron Besar used the play the simple melody, meanwhile Saron Kecil to enrich the main melody.

Traditional Music: Music that handed down from generation to generation.

Panoramic: Spatial Stereo of sound.

Recording: Art of capturing the sound and manipulating in various means.

Reverb: Repetitions of an audio signal which become denser with time as the signal decaying. A signal processing unit.

1.9 Organization of Thesis

Chapter 1 : Introduction, introduce the main ideas of the study topic. Starting with overview of the overall study in glimpse with insight to the topic. Explaining the background, statement of problem, research question and objective. Limitation to the study and technical pre-condition. Application of research methodology in the study with conceptual frame that adopted to establish the findings of the study.

Chapter 2 : Literature Review, explaining the importance of sound archiving and preservation of Gamelan Melayu. Studying the history of this traditional music establishment in Malaysia. Exploring the current state of the preservation in Malaysia and early history of Gamelan Melayu recordings. Identifying the major components of the instruments in Gamelan Melayu and identifying the difference with other's Gamelan around the region. Learning the repertoire and notation commonly used in this traditional music. Search and acquiring selections of recordings for analysis and comparison.

Chapter 3 : Sound Technical & Preservation of Gamelan Melayu, understanding the microphone patterns and miking technique. Identifying past recordings. Adopting standards and guidelines provided by international associations and organisation for archiving and preservation of sound materials. Explaining the test conducted, favourable miking technique that suited for the study. Develop information and data for archiving and preservation. Showing how the metadata could be preserve for future retrieval.

Chapter 4 : Analysis and Discussions, of early recordings with comparing with selected sound sample and the research recodings result. To establish and identifying the miking technique and technical of the recordings. Using frequency spectrum and spectrogram analysis on the final product to establish the difference and irregularity. Build the infographic documents and guidance for retrieval. Discuss the informants recommendation for future carrying forward methods and safe keeping.

Chapter 5 : Conclusion and Recommendation, returns to the four elements of the objectives and describes recording, explaining and performing professional audio studies from the perspective of sound engineering exploring Gamelan Melayu for preservation. From deriving sound views that support a technical specification of metadata as means of preservation in an effective way, to assembling of recorded Gamelan Melayu ensemble repertoire and its technical specification descriptions into an archive characterized by technical comment by outcome and findings. Therefore, this chapter considers the importance of the results for implementation and recommendation for future studies.

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Muralitheran a/l Munusamy is a Recording Industry of Malaysia (RIM) and Malaysian Association of Commercial Radio Operators (MACROS) award winning audio engineer. He has numerous years of comprehensive experience leading companies from start-up, through revitalization, to turnaround, and accelerated growth to almost the same in years of experience in the arts, music, media and broadcast industry. Born in 1977, he studied Diploma in Electric & Electronic (1998) at Institute Technology Jaya, Kuala Lumpur, Malaysia. Further his education in field of audio engineering at S.A.E. Institute of Technology, Sydney, Australia graduating with Cert IV Audio Engineering (2001). Completing his Bachelor of Arts (Hons) in Recording Arts (2003) from Middlesex University and S.A.E. Institute of Technology, Sydney, Australia. Enhance his skills further in sound mixing under guidance of Jimmy Douglas at Mix with the Masters (2013), Avignon, France. Very fondly known in the industry as "*astacfunk"*. He has both recorded and engineered for several big name's artiste locally and internationally such as Altimet, Kid Santhe, Aman Ra, SleeQ, Reshmonu, Joe Flizzow, Sona One, Sheila Majid, Ning Baizura, and Ruffedge. Aside from music, he has also engineered for numerous TV commercials, documentaries and films for Crime Investigation Network, History Channel, Go Asean, Astro and many more. An avid traveller, active educator and trainer in private university and public institutions. His cores of expertise are in Live Sound, Location Recording, Broadcasting, Media Content & Production, Production Managements, Recording, Mixing & Mastering and Audio Pre/Post Production. He was the President of Audio Engineering Society (AES) Malaysia from 2009 – 2011. Served as external panel member in the MDEC (2013-2016) for creative industry development. Certified Professional Mixing & Mastering Engineer (2016) by CCIG Malaysia. Currently working as Streaming Media Engineer (APAC Lead) for a reputable service provider for online webcast and conferences base in US and still continuing his passion in audio engineering.

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