

The Tongkungon of Sabah: Acoustic Analysis and Organological Perspectives on a Kadazan-Dusun Bamboo Zither

Alexander Chelum,^{a,*} Laura Prati Tutom,^a Sinin Hamdan,^b and Aaliyawani Ezzerin Sinin^c

The tongkungon is a plucked bamboo zither of the Kadazan-Dusun community in Sabah, Malaysia, reflecting both material ingenuity and cultural resilience. Historically used as a substitute for gong ensembles and as accompaniment to dances such as Magarang, its practice has declined due to modernization and the erosion of oral transmission. This study applies a postmortem framework, combining acoustic analysis, organological classification, and ethnomusicological interpretation. Acoustic measurements based on Fast Fourier Transform (FFT) and time-frequency analysis (FTA) reveal a pentatonic tuning system (F, A, B, C, E), with tonal instability caused by bamboo fiber variations. The tongkungon is classified organologically as an idiochord tube zither, linking it to wider Southeast Asian bamboo traditions. Culturally, it has functioned both as a pedagogical tool and as a symbol of Kadazan-Dusun identity. Although its active role has diminished, documentation and revitalization through education, cultural festivals, and creative collaborations offer pathways for safeguarding it as intangible cultural heritage.

DOI: 10.15376/biores.21.4.10098-10107

Keywords: Tongkungon; Kadazan-Dusun music; Bamboo zither; Organology; Acoustic analysis

Contact information: a: Faculty of Applied and Creative Art, Universiti Malaysia Sarawak, 94300 UNIMAS, Kota Samarahan, Sarawak, Malaysia; b: Faculty of Engineering, Universiti Malaysia Sarawak, 94300 UNIMAS, Kota Samarahan, Sarawak, Malaysia; c: Department of Science and Technology, Faculty of Humanities, Management and Science Universiti Putra Malaysia Sarawak, 97008 Bintulu, Sarawak, Malaysia; *Corresponding author: calexander@unimas.my

INTRODUCTION

Musical instruments are deeply embedded in the cultural life of communities. Beyond their role as sound-producing devices, they function as carriers of memory, identity, craftsmanship, and ecological knowledge. Across Southeast Asia, bamboo has long been an essential material in the development of musical instruments due to its abundance, acoustic properties, and symbolic associations with the natural environment (Kartomi 1990; Wegst 2008).

In the island of Borneo, bamboo instruments have played a central role in shaping the sonic landscapes of indigenous communities, reflecting both environmental adaptation and cultural creativity (Matusky and Tan 2004; Chin 2011).

Among the Kadazan-Dusun community of Sabah, several distinctive bamboo instruments have been developed, including the sompoton (mouth organ) (Hamdan *et al.* 2022), sundatang (zither) (Hamdan *et al.* 2025a), and togunggak (bamboo stamping tubes). (Ezra *et al.* 2025). These instruments collectively form an important part of musical traditions associated with social gatherings, communal celebrations, and cultural expression (Matusky and Beng 2017). One instrument that reflects both musical ingenuity and material adaptation is the tongkungon (Hamdan *et al.* 2025b), a plucked bamboo tube zither constructed by raising fiber strings directly from the bamboo culm. Organologically, the tongkungon belongs to the category of idiochord bamboo tube zithers, in which the strings are created from the same bamboo body rather than attached separately (Hornbostel and Sachs 1961; Kartomi 1990). Similar instruments can be found across Southeast Asia, including the Pek'bu of the Lun Bawang in Sarawak and the Kolutong of the Cordillera region in the Philippines (Lim 2011; Maceda 1998). Within this broader regional tradition, the tongkungon occupies a unique position due to its ability to imitate the rhythmic and melodic structures of the Sopogandangan gong ensemble, a central musical expression of Kadazan-Dusun cultural identity.

Previous studies have primarily focused on the acoustic characteristics and material properties of bamboo instruments, including recent acoustic measurements of the tongkungon that identified a pentatonic tonal structure and irregular harmonic behavior resulting from natural variations in bamboo fibers. While these studies provide valuable scientific insight into the instrument's acoustic behavior, relatively little attention has been given to the organological interpretation and cultural significance of the instrument within the broader context of heritage transmission and contemporary cultural change. In recent decades, the practice of playing and constructing the tongkungon has declined significantly. Modernization, changes in leisure activities, and the growing influence of global popular music have reduced the instrument's role in everyday community life. As a result, the traditional knowledge associated with tongkungon construction and performance, historically transmitted through oral tradition and practical apprenticeship, is increasingly fragile. Similar patterns of decline have been observed in many traditional musical practices worldwide, raising concerns about the sustainability of intangible cultural heritage (UNESCO 2003).

This article therefore extends previous technical research by presenting a postmortem interpretive analysis of the tongkungon that integrates acoustic knowledge with organological and ethnomusicological perspectives. Rather than focusing solely on acoustic measurement, the study examines the instrument as a cultural artifact embedded in historical practice, community learning processes, and contemporary heritage discourse. Specifically, the article addresses three interrelated aspects: the structural and organological characteristics of the tongkungon as a bamboo tube zither, the acoustic properties that shape its distinctive sonic identity, and the cultural roles of the instrument as both a musical substitute for gong ensembles and a pedagogical medium for learning traditional musical patterns. By situating the tongkungon within both regional bamboo zither traditions and contemporary discussions on cultural sustainability, this study contributes to broader efforts to document and revitalize indigenous musical knowledge. The article also highlights potential pathways for safeguarding the instrument through documentation, educational initiatives, and digital dissemination, ensuring that the tongkungon continues to be recognized not only as a historical artifact but as a meaningful expression of Kadazan-Dusun cultural heritage.

EXPERIMENTAL

This study adopts an interdisciplinary analytical approach that integrates acoustic interpretation, organological classification, and ethnomusicological contextualization in order to examine the tongkungon as both a musical instrument and a cultural artifact. The methodological framework combines technical analysis of previously documented acoustic data with interpretive perspectives drawn from organology and cultural heritage studies. Acoustic information used in this study was derived from recordings analyzed by Hamdan *et al.* (2025b), who conducted controlled studio measurements of tongkungon sounds using Fast Fourier Transform (FFT) and time frequency analysis (TFA). These analyses identified fundamental frequencies, overtone structures, and sustain characteristics of the instrument's strings. Rather than repeating the acoustic measurements, the present study interprets these findings within a broader analytical framework that considers the structural properties of the instrument and its cultural functions within Kadazan-Dusun musical traditions.

Organologically, the tongkungon is examined using the Hornbostel–Sachs classification system, which categorizes musical instruments based on their sound production mechanisms (Hornbostel and Sachs 1961). Within this framework, the tongkungon is identified as an idiochord bamboo tube zither, a type of chordophone in which the strings are created directly from the bamboo body itself. This classification enables comparison with related bamboo zithers found across Southeast Asia, including the Pek'bu of the Lun Bawang in Sarawak and the Kolitong of the Philippines, thereby situating the tongkungon within a broader regional tradition of bamboo instruments. Ethnomusicological perspectives were incorporated through a review of existing literature on Kadazan-Dusun music and Southeast Asian bamboo instruments (Lim 2011; Chong 2016; Matusky and Beng 2017). These sources provide insights into the historical functions of the tongkungon, including its role as a substitute for gong ensembles and as a pedagogical tool for learning rhythmic structures associated with the Sopogandangan ensemble. In addition to technical and historical sources, the study also considers issues related to cultural transmission and heritage sustainability. Particular attention is given to the processes through which tongkungon knowledge has historically been transmitted through oral tradition and informal apprenticeship, as well as the challenges posed by modernization and changing cultural contexts. By combining acoustic interpretation, organological analysis, and ethnomusicological contextualization, this methodological approach allows the tongkungon to be examined not only as a physical musical instrument but also as a cultural medium embedded within broader processes of knowledge transmission, identity formation, and heritage preservation.

RESULTS AND DISCUSSION

The tongkungon's organology, acoustic behavior, and cultural role were analyzed. Constructed from *Gigantochloa levis* bamboo, the tongkungon typically measures 60 cm. Fiber strings are raised directly from the culm and tensioned with pegs, while the tube is partially split to create a resonator. Most instruments contain between four and eight strings, although some have up to fifteen. Each instrument is unique, with tonal quality influenced by bamboo thickness and fiber density. Figure 1 shows the front view, back view, left view with 2 strings, and right view with 4 strings. Although the figure illustrates

the external structure of the instrument, detailed documentation of the crafting process remains limited due to the decreasing number of active instrument makers. Future research should prioritize systematic visual documentation of tongkungon construction techniques.



Fig. 1. Structural views of the tongkungon bamboo zither showing the front, back, and lateral perspectives with raised bamboo fiber strings

Figure 1 highlights three main structural features: the bamboo body, the raised fiber strings, and the split resonators.

1. *Bamboo Tube (Body)*

The bamboo body provides both the structural framework and the resonating chamber for the instrument. Its dimensions, wall thickness, and fiber density directly influence the instrument's tonal quality.

2. *Strings (Raised Bamboo Fibers)*

The strings are not separate materials but are raised directly from the bamboo culm itself. Artisans cut narrow strips along the bamboo's length and elevate them slightly, leaving them attached at both ends. These raised fibers are tensioned with small wooden wedges or pegs inserted beneath them, which create string-like properties capable of being plucked. The number of strings can vary, but Fig. 1 illustrates a typical arrangement of multiple fibers stretched along the bamboo tube.

3. *Split Resonators*

The split resonators are partial cuts into the bamboo body that create hollowed sections. These splits increase resonance by allowing the bamboo tube to vibrate more freely when the strings are plucked. Functionally, they act like sound holes, amplifying and shaping the instrument's tonal output. The positioning of two split resonators divides the body into three sections, a feature that enhances the amplification of different frequency ranges.

When a performer plucks the raised fiber strings, the vibrations are transmitted into the bamboo body. The split resonators amplify these vibrations, producing a distinctive timbre characterized by both harmonic and non-harmonic overtones. The design reflects a balance of ecological practicality and acoustic ingenuity: a single piece of bamboo is transformed into a complete chordophone, with both strings and resonator integrated into one natural material. Acoustic analysis confirmed a pentatonic tuning system (F, A, B, C, E). Table 1 shows the six strings produced frequencies at approximately 260 Hz (C4), 330 Hz (E4), 250 Hz (B3), 200 Hz (A3), 180 Hz (F3), and 200 Hz (A3). Sustain varied: string three resonated longest, while strings one and six decayed rapidly. FFT and TFA revealed harmonic and non-harmonic partials, reflecting irregular bamboo fiber structure (Hamdan *et al.* 2025b).

Table 1. The Six Strings Produced Frequencies at Approximately 260 Hz (C4), 330 Hz (E4), 250 Hz (B3), 200 Hz (A3), 180 Hz (F3), and 200 Hz (A3)

String No.	Frequency (Hz)	Pitch	Harmonics Observed	Sustain
1	260	C4	530, 810, 1210 Hz	Short
2	330	E4	660 Hz + non-harmonics	Medium
3	250	B3	500, 760, 1050 Hz	Long
4	200	A3	440, 600, 880 Hz	Medium
5	180	F3	360 Hz	Medium
6	200	A3	670, 890 Hz + octave lower (100 Hz)	Short

The tongkungon historically occupied an important position in Kadazan-Dusun musical life, functioning both as an instrument of entertainment and as a practical substitute for larger ensembles. One of its most prominent roles was in accompanying community dances such as Magarang, a performance practice associated with festive gatherings rather than ritual occasions. In these contexts, the tongkungon provided rhythmic and melodic support that animated social interaction and fostered a sense of collective enjoyment. Unlike the bronze gong ensembles that were often reserved for ceremonial or formal occasions, the tongkungon was more flexible, portable, and accessible, allowing music-making to flourish in more intimate and informal settings.

Its most distinctive role was as a substitute for the Sopogandangan gong ensemble, which remains one of the most central soundscapes of Kadazan-Dusun musical identity. Normally requiring multiple performers to produce interlocking rhythmic cycles, the gong ensemble could be faithfully imitated by a single musician on the tongkungon. This capacity made the instrument both practical and symbolically powerful, as it demonstrated the resourcefulness of transforming a simple bamboo tube into a medium that sustained the communal sound of gongs. In times when bronze gongs were unavailable because of cost, scarcity, or social circumstances, the tongkungon ensured that the essence of gong music was preserved.

The pedagogical role of the tongkungon further underlines its cultural importance. It served as a training instrument for younger members of the community who were preparing to join gong ensembles. By practicing on the tongkungon, learners could internalize rhythmic patterns and cyclical structures without requiring multiple musicians or access to costly instruments. In this sense, the tongkungon acted as an intermediary between individual practice and communal performance, ensuring continuity in musical knowledge and reinforcing the intergenerational transmission of cultural values. Music education within the Kadazan-Dusun community was thus embedded in daily life, with the

tongkungon functioning as an accessible pathway into more formal musical roles. In contemporary Sabah, however, the tongkungon has experienced a significant decline. The combined effects of modernization, shifting leisure activities, the growing influence of global popular music, and the weakening of oral transmission have marginalized its practice. The instrument is now rarely encountered in everyday gatherings and is largely confined to curated contexts such as cultural festivals, museum exhibitions, and academic demonstrations. These settings preserve its visibility but risk reducing it to a staged heritage object rather than sustaining it as a living practice. Despite this decline, the tongkungon endures symbolically as an emblem of Kadazan-Dusun identity. Its presence in heritage showcases affirms its value as a cultural marker that embodies both the creativity of past generations and the resilience of indigenous traditions. Even when not regularly played in daily life, the tongkungon remains a link to the past and a reminder of the adaptability that has long characterized Kadazan-Dusun musical culture. This dual condition of vulnerability in practice but resilience in meaning defines the tongkungon's cultural role in the present.

The tongkungon embodies the convergence of material adaptation, acoustic complexity, and cultural meaning. Its construction demonstrates the ingenuity of transforming bamboo into a zither capable of replicating the rhythmic structures of gong ensembles. This innovation illustrates a sophisticated understanding of bamboo as both a material and an acoustic resource. While scientific analysis highlights tonal instability and irregular sustain as outcomes of bamboo fiber variability, within the cultural context these irregularities are embraced as defining characteristics of the instrument. What might be dismissed as technical limitations in standardized instruments are, in fact, essential elements of the tongkungon's sonic identity. Its sound is distinctive, recognizable, and inseparable from the ecological and cultural environment in which it is created.

The cultural role of the tongkungon reinforces its importance as more than a technical artifact. Historically, it functioned as both a practical instrument and a pedagogical tool. It substituted for bronze gong ensembles when these were unavailable, ensuring that musical expression remained accessible to the community. At the same time, it provided a platform for younger musicians to internalize the cyclical structures of gong music before joining formal ensembles. In this way, the tongkungon was embedded in the social fabric of Kadazan-Dusun life, connecting individual practice with collective performance and ensuring the transmission of knowledge across generations. The instrument thus represents not only cultural resilience but also adaptability, reflecting the community's ability to sustain its music-making practices under conditions of scarcity. The decline of tongkungon practice in contemporary Sabah highlights the fragility of intangible cultural heritage in the face of rapid modernization. The shift in leisure preferences, the influence of globalized popular music, and the weakening of oral transmission have eroded its role in everyday life. Today, the tongkungon is rarely encountered in spontaneous community gatherings and is largely confined to curated contexts such as cultural festivals, heritage exhibitions, and academic demonstrations. These settings safeguard its visibility but risk reducing the instrument to a staged heritage object rather than preserving it as a living tradition. This transformation underscores a broader tension in cultural heritage work: the balance between preserving visibility and sustaining practice.

Despite these challenges, the tongkungon continues to offer opportunities for revitalization. Documentation of its organology and acoustic properties provides a critical foundation for preservation, enabling future generations to reconstruct and study the instrument. More importantly, revitalization depends on re-situating the tongkungon within

living cultural contexts. Educational curricula can introduce it to younger audiences, heritage festivals can provide platforms for performance, and collaborations with contemporary musicians can reimagine its possibilities beyond traditional settings. These strategies are consistent with UNESCO's Convention for the Safeguarding of the Intangible Cultural Heritage, which emphasizes that safeguarding must go beyond static preservation and allow for adaptation and creativity. The tongkungon has the potential to evolve while retaining its cultural essence, bridging past and present in meaningful ways.

In this sense, the tongkungon represents both vulnerability and resilience. Its vulnerability lies in its declining practice and the risk of knowledge loss as oral traditions weaken. Its resilience is evident in its continued symbolic value and its potential for reintegration through deliberate revitalization efforts. The urgency of sustaining the tongkungon demands strategies that balance rigorous documentation, community engagement, educational initiatives, and supportive cultural policy. Only through such an integrated approach can the tongkungon remain more than an artifact of the past, continuing instead as a living expression of Kadazan-Dusun identity, creativity, and adaptability.

Traditionally, the knowledge associated with the tongkungon was transmitted primarily through oral and experiential learning within the Kadazan-Dusun community. Elder musicians and instrument makers played a crucial role in passing down both performance techniques and construction skills to younger generations. This process often took place informally during communal gatherings, festive occasions, and everyday social interactions, where younger members of the community learned by observing, imitating, and gradually participating in musical activities. Unlike formal music education systems, the transmission of tongkungon knowledge relied heavily on practical demonstration rather than written documentation. This form of oral transmission reflects a broader pattern found in many indigenous musical traditions, where knowledge is embedded in lived experience and communal participation. In such contexts, musical knowledge is not merely technical but also cultural, encompassing social values, aesthetic sensibilities, and collective identity. The tongkungon therefore functioned not only as a musical instrument but also as a medium through which cultural knowledge and social relationships were reinforced within the community.

However, the weakening of traditional transmission mechanisms has contributed significantly to the decline of tongkungon practice in contemporary Sabah. Urbanization, migration, and changing leisure preferences have reduced opportunities for younger generations to engage directly with traditional musicians and instrument makers. As a result, much of the knowledge that was once shared through apprenticeship and observation risks being lost if it is not systematically documented. In response to this challenge, documentation has become an increasingly important strategy for safeguarding intangible cultural heritage. Ethnographic interviews with elder musicians, audio recordings of performances, and visual documentation of instrument construction can provide valuable resources for future researchers, musicians, and cultural practitioners. Such documentation not only preserves technical knowledge but also captures the cultural narratives and meanings associated with the instrument. By combining written documentation with audio-visual materials, researchers and cultural institutions can contribute to creating archives that support both academic research and community revitalization efforts. In this sense, documentation should not be viewed merely as preservation of the past but as an active process that supports the continuity and reinterpretation of traditional musical knowledge in contemporary contexts.

While the decline of traditional performance contexts presents challenges for the survival of the tongkungon, contemporary digital technologies also create new opportunities for cultural revitalization. In recent years, digital platforms have become important tools for documenting, sharing, and promoting traditional musical practices beyond their original communities. Online media such as video platforms, digital archives, and social media networks allow traditional instruments and performance practices to reach broader audiences, including younger generations who are increasingly engaged with digital culture. For example, video recordings of tongkungon performances can serve as valuable educational resources that demonstrate playing techniques, musical patterns, and instrument construction methods. These materials can be disseminated through online platforms, enabling both traditional practitioners and new learners to access knowledge that was previously transmitted primarily through face-to-face interaction. In this way, digital media can complement traditional modes of knowledge transmission rather than replace them.

Digital dissemination also opens possibilities for creative reinterpretation and revival of traditional instruments. Musicians may incorporate the tongkungon into contemporary musical contexts, experimental performances, or cross-cultural collaborations, thereby expanding its relevance beyond its traditional setting. Revivalist concerts, educational workshops, and multimedia presentations can further contribute to raising awareness of the instrument and encouraging renewed interest among younger audiences. Importantly, such revitalization efforts do not necessarily require a return to past cultural conditions. Instead, they allow traditional instruments to evolve within modern cultural environments while maintaining their historical and cultural significance. From this perspective, the integration of traditional musical knowledge with modern communication technologies represents a complementary pathway for safeguarding intangible cultural heritage in the twenty-first century. The present article itself may therefore be seen as part of this broader process of cultural documentation and dissemination. By presenting organological, acoustic, and cultural perspectives on the tongkungon, the study contributes to increasing awareness of the instrument and highlights the importance of continued research, education, and creative engagement to ensure its long-term cultural sustainability.

CONCLUSIONS

1. The tongkungon is more than a bamboo zither; it is a cultural emblem of Kadazan-Dusun ingenuity, resilience, and identity. As an organological artifact, it demonstrates the community's capacity to transform bamboo into a sophisticated musical instrument capable of replicating the rhythmic cycles of gong ensembles.
2. Its acoustics reveal both the strengths and constraints of bamboo as a raw material: tonal instability, uneven sustain, and variability in fiber structure are inseparable from its unique timbre. These qualities, often viewed as technical irregularities in standardized instruments, are what give the tongkungon its distinctive sonic character and cultural authenticity.
3. Culturally, the tongkungon has played roles that extend beyond its physical form. It was not only a source of entertainment but also a substitute for gong ensembles,

ensuring that the essence of communal music could be sustained even in the absence of bronze instruments.

4. Equally significant was its function as a pedagogical tool, allowing younger musicians to internalize the structures of gong cycles before entering formal performance contexts. These roles embedded the tongkungon into everyday life, linking individual practice with collective identity and reinforcing intergenerational transmission of musical knowledge.
5. In contemporary Sabah, the decline of tongkungon performance reflects the vulnerability of intangible cultural heritage in an era of modernization and globalization. Its presence has shifted from daily community use to curated spaces such as cultural festivals, museum exhibitions, and academic demonstrations. While these contexts preserve visibility, they risk reducing the tongkungon to a static display rather than sustaining it as a dynamic, living tradition.
6. The future of the tongkungon depends on coordinated preservation efforts that integrate scientific documentation, ethnographic research, and educational initiatives. By documenting its acoustic and structural properties, recording cultural narratives, and introducing the instrument through educational and cultural programs, it is possible to support its continued relevance in contemporary society. Such integrated efforts can ensure that the tongkungon remains not merely a relic of the past but a living expression of Kadazan-Dusun cultural identity and creativity.

ACKNOWLEDGMENTS

The authors wish to acknowledge Universiti Malaysia Sarawak (UNIMAS) and Universiti Putra Malaysia Sarawak for the technical and financial support provided for the smooth implementation of this project.

Use of Generative Artificial Intelligence

During the preparation of this manuscript, the authors used a generative AI language model (ChatGPT, OpenAI) solely to support language refinement, paraphrasing, and improvement of clarity. No figures, images, tables, graphs, or diagrams were generated using AI tools. All scientific content, data interpretation, analyses, and conclusions were produced and verified by the authors, and the final manuscript was carefully reviewed prior to submission.

REFERENCES CITED

- Chin, G. (2011). *Musical instruments of Sabah*, Kota Kinabalu: Sabah Museum.
- Chong, L. S. (2016). "Surviving traditional music instruments of Dusun Tindal within its modern community in Kampun Tinuhan," *International Journal of Creative Future and Heritage* 4(2), 63-84. <https://doi.org/10.47252/teniat.v4i2.344>
- Hamdan, S., Rahman, M. R., Mohamad Said, K. A., Zainal Abidin, A. S., and Musib, A. F. (2022). "Sompoton: Sabah bamboo mouth organ," *BioResources* 17(3), 5335-5348. <https://doi.org/10.15376/biores.17.3.5335-5348>

- Hamdan, S., Duin, E. A. M., Mohamad Said, K. A., Kipli, K., Sinin, A. E., and Musib, A. F. (2025a). "Sundatang-Sabah's lost lute of Borneo," *BioResources* 20(3), 5331-5347. <https://doi.org/10.15376/biores.20.3.5331-5347>
- Hamdan, S., Mohamad Said, K. A., Kipli, K., Duin, E. A. M., and Sinin, A. E. (2025b). "The tongkungon: A traditional Kadazan-Dusun plucked musical instrument from Sabah, Malaysia." *BioResources* 20(1), 357-367. <https://doi.org/10.15376/biores.20.1.357-367>
- Ezra, M. A., Duin, E. A. M., Hamdan, S., Said, K. A. M., Kipli, K., Sinin, A. E., and Musib, A. F. (2025). "Togunggak: Traditional music of Kadazandusun," *BioResources* 20(4), 9753-9767. <https://doi.org/10.15376/biores.20.4.9753-9767>
- Hornbostel, E. M. von, and Sachs, C. (1961). "Classification of musical instruments," *Galpin Society Journal*, 14, 3-29. <https://doi.org/10.2307/842168>
- Kartomi, M. (1990). *On Concepts and Classifications of Musical Instruments*, Chicago, University of Chicago Press.
- Lim, C. K. N. (2011). "The Pek'bu played by the Lun Bawang: Its performance and music," *The Sarawak Museum Journal* 68(89), 41-52. <https://doi.org/10.61507/smj22-2011-Z3T4-02>
- Maceda, J. (1998). *Gongs and Bamboo: A Panorama of Philippine Music Instruments*, Manila, University of the Philippines Press.
- Matusky, P., and Beng, T. S. (2017). *The Music of Malaysia: The Classical, Folk and Syncretic Traditions*, 2nd Ed., Routledge, London
- Matusky, P., and Tan, S. B. (2004). *The Music of Malaysia: Classical, Folk and Syncretic Traditions*, Aldershot: Ashgate.
- UNESCO. (2003). *Convention for the Safeguarding of the Intangible Cultural Heritage*, UNESCO, Paris. <https://ich.unesco.org/en/convention>
- Wegst, U. G. K. (2008). "Bamboo and wood in musical instruments," *Annual Review of Materials Research* 38, 323-349. <https://doi.org/10.1146/annurev.matsci.38.060407.132459>

Article submitted: December 17, 2025; Peer review completed: March 7, 2026; Revised version received: March 13, 2026; Accepted: August 6, 2026; Published: August 27, 2026.

DOI: 10.15376/biores.21.4.10098-10107