



How the directivity of bundengan affects its musical performance

Indraswari KUSUMANINGTYAS¹; Raymond CHRISTIANTO²; Gea O.F. PARIKESIT², Rosie H. COOK³,
Muhammad S. ABDULLOH⁴, Luqmanul CHAKIM⁴, Mulyani MOELYA⁵, Nicole A. TSE⁶, Margaret J. KARTOMI⁷,
G.R. Lono L. SIMATUPANG⁸

⁽¹⁾ Dept. Mechanical & Industrial Eng., Universitas Gadjah Mada, Yogyakarta, Indonesia, i.kusumaningtyas@ugm.ac.id

⁽²⁾ Dept. Nuclear Eng. & Eng. Physics, Universitas Gadjah Mada, Yogyakarta, Indonesia

⁽³⁾ Conservation Center, Cheng Shiu University, Kaohsiung City, Taiwan

⁽⁴⁾ Woohoo Art-Space, Rowopeni, Kalianget, Wonosobo, Indonesia

⁽⁵⁾ SMPN 2 Selomerto, Kalierang, Selomerto, Wonosobo, Indonesia

⁽⁶⁾ Grimwade Centre for Cultural Materials Conservation, University of Melbourne, Carlton, VIC, Australia

⁽⁷⁾ Music Archive of Monash University, Clayton, VIC, Australia

⁽⁸⁾ Performing Arts and Visual Arts Studies, Universitas Gadjah Mada, Yogyakarta, Indonesia

Abstract

Bundengan is a traditional musical instrument from Indonesia that has a half-dome structure, and uses clipped strings and long, thin bamboo plates to generate metal-like and drum-like sounds, respectively. The physics of the clipped strings have been unraveled, but the interaction between the strings and the half-dome resonator has been largely unknown. In this work, we investigate this interaction, particularly by measuring the directivity of the bundengan as the string vibrations are amplified by the resonator. We performed two sets of measurements, where a number of bundengans were played by traditional and contemporary artists, respectively. This quantitative data complement our interviews with, and qualitative observations on, the artists to provide a comprehensive insight on how the directivity affects the musical performance of the bundengan. Our results show that the directivity patterns of different bundengans are generally similar, although the detailed characteristics have variances. This is mainly due to the traditional, unstandardized, manufacturing method of the bundengans by different craftsmen. The interaction of the string and the resonator creates a directivity pattern that is unique from the vibrating string displacement or the resonator shape. These findings allow bundengan makers and players to make improvements to enhance the instrument's musical performance.

Keywords: Bundengan, Directivity, Performance.

¹ i.kusumaningtyas@ugm.ac.id