UNIVERSITI TEKNOLOGI MARA

THE BAMBOO BENDING CAPABILITIES AS LANDSCAPE STRUCTURES FOR SUSTAINABLE CONSTRUCTION: CASE STUDY OF DENDROCALAMUS ASPER

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ABSTRACT

Bamboo is one of the fastest-growing natural construction materials and is locally available in the most developing world, including South America, Africa, and Asia. It is a fast-growing monocotyledon species belonging to the *Gramineae* (family *Bambusoideae*) and requires a short time for re-production, estimated to expand a meter a day (Mustafa et. al, 2019). The mechanical qualities of bamboo, strong fibre, compressive strength higher than concrete, and tensile strength close to steel have attracted designers and construction professionals to explore it for experimental and ground-breaking construction themes. Due to its capability to bend, one of the best mechanical properties of bamboo has made it the most preferred material in vernacular construction and lately sustainable development. However, the professionals in Malaysia, namely landscape architects, architects, and engineers, are not well equipped in bamboo bending capacities, resulting in restricted use in construction work. This study will focus on the bending capability of Malaysian bamboo species; *Dendrocalamus asper* or Buluh Betung known for its suitability in the construction method. This research will adopt an experimental study on the Bundle Bamboo Split (BBS) method derived from LR, namely Bali (BBS 1, BBS 2) and China(BBS3) Experience, which resulting in Ipoh Result(BBS 4) with diameter of 0.8m, thus establish the best BBS for application in Pilot Test Model. FGD between experts will validate the findings, and analysis using Content Analysis will produce a Theoretical Framework to reveal the suitable landscape structures. Furthermore, the construction of Bamboo Pavilion in Dataran Bandaraya, Ipoh, will highlight the capability of *Dendrocalamus asper* as the main component in bendable bamboo that represent the local identity of Tropical Malaysia.

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Lastly, for emak, who in this last final moment of journey, she left us, may this knowledge will spreads and benefits you and ayah in akhirat.

May Allah bless us, In sya Allah.

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CHAPTER ONE
INTRODUCTION

1.1 Background

Bamboo is known as green gold and has been sustainable material for construction and possesses excellent strength properties, especially tensile strength(Ahmad, 2001). It is a fast-growing monocotyledon belonging to the *Gramineae* (family *Bambusoideae*), requires a short time to regrow, widely available, low-cost, and carbon-sequestering natural resources.

Bamboo is a plant that grows worldwide; more than 1500 species are distributed worldwide in tropical, equatorial, and semitropical climates. Through observation, bamboo grows in three distinct regions, patches on the edge of the riverbanks of human settlement and the forest area(Azmy & Appanah, 1991). In Malaysia, its location is scattered and covers 5% of the total forest area(Latif et al., 1990). Therefore, bamboo is considered a plant that follows humans and has significant purposes for a particular group of people. The study on ethnobotany for this plant relates to bamboo as a construction material related to building structures (Mohamad, 2010).

Due to its' abundance, availability and growth rate, bamboo favours construction materials worldwide. Also, bamboo is used as material in construction, various embellishments, paper sheet production, erosion control, and positive features towards life such as prosperity, peace, and mercy (Siti et al., 2013). She also notes the non-biodegradable of other materials compared to bamboo, environmental loss due to timber felling, and climate change via forest clearing.

International Bamboo and Rattan Organization (INBAR) recently outlined bamboo use in the circular economy, consisting of

a. Renewable

b. Resource Efficient

c. Recyclable

d. Low Carbon

d. Durable.