

UNIVERSITI TEKNOLOGI MARA

**PRESERVATION OF CULTURAL
HERITAGE: A COMPARISON
STUDY OF 3D MODELING
BETWEEN LASER SCANNING,
DEPTH IMAGE AND
PHOTOGRAMMETRY METHODS**

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ABSTRACT

Preservation of historic structures is of paramount importance to avoid the loss of Malaysia's architectural heritage. This study proposes a multi-technique approach for capturing and documenting historical legacy, focusing on the creation of three-dimensional (3D) model representations of physical artefacts and the utilization of orthographic projection to document design. The study employs three primary techniques, namely laser, depth imaging, and photogrammetry, to create a three-dimensional object, followed by a comparative evaluation of their effectiveness. To evaluate the techniques, a case study is conducted, utilizing a 25cm scale model of the historical Portuguese Indian Armada ship "Flor de la Mar" as a sample for 3D model record development. The outcomes indicate that photogrammetry is the most effective technique in terms of accuracy, precision, and visualization, while laser scanning and depth imaging produce less precise point cloud data. The photogrammetry method attains 97.6% accuracy in terms of dimensions and shapes. Based on the results, this promising technology can be employed to document data blueprints for the actual measurements of classic ships.

Keywords: *historical preservation, 3D scanning, laser scanning, depth imaging, photogrammetry*

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Preservation refers to the act of maintaining and safeguarding objects or non-objects for future reference. This study aims to investigate the most effective method for preserving historic maritime buildings, specifically traditional boats. The research outlined in this thesis involves conducting experiments on a scale model of a traditional boat in the form of a three-dimensional (3D) model.

This section provides an overview of the study, beginning with a discussion of the importance of preserving traditional boats in our country. It then presents the problem statements, research objectives, and research questions that guided the study. Additionally, this chapter outlines the limitations of the study and the significance of its findings. The discussion in this chapter concludes with a summary of the key points presented.

1.2 Research Background

Since the 19th century, Malaysia has been a developing nation (Ahmad et al., 2013), and the technological revolution is crucial for its future growth. As technology advances, traditional building methods are becoming forgotten.

In East Peninsular Malaysia, Terengganu, the development of distinctive traditional sailing ships was a significant event (Latif et al., 2015). These ships were wind-powered vessels made of Chengal wood, which were built by Malay craftsmen such as Hasni Che Ali on Pulau Duyung. The Pinas, Payang, Bedar, Sekoci, and Kolek are some of the traditional ships built by him and bear his name as a testament to his skills as a designer and maker. It is worth noting that many of these ships were built without the aid of blueprints or designs. In 1955, a Malay ship, Pinas, was even featured on a British postage stamp (Ahmad et al., 2013). The Malays have been building this type of watercraft out of Chengal wood since the 19th century, and it is an important part of Malay maritime culture. One of the more experienced craftsmen in Terengganu was Hasni Che Ali, who lived on Pulau Duyung. Many of the traditional ships he