

UNIVERSITI TEKNOLOGI MARA

**FEASIBILITY STUDY OF THE
CONTROL POINT DISTRIBUTION
DESIGN IN IMPLEMENTATION
UAV PHOTOGRAMMETRIC MAP
PRODUCTION**

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ABSTRACT

Nowadays, unmanned aerial vehicle (UAV) photogrammetry has been popular in recent years, and surveyors are increasingly using it to collect data. Photogrammetry using UAV requires less manpower and time to collect data, and it may also collect data in inaccessible areas. However, ground control point (GCPs) distribution may affect the accuracy of UAV photogrammetry results. In recent years, people are not in survey field also knows unmanned aerial vehicle (UAV) photogrammetry however, they are not experts in photogrammetric survey. Thus, further investigation is to get low accuracy in UAV photogrammetric control. For that purpose, this study focuses on identifying the distribution of GCPs for unmanned aerial vehicle (UAV) photogrammetry. For benchmarking, well distributed GCPs have been established by using ideal network configuration which is scattered. GCPs have known coordinate in three-dimensional (3D) that have been positioned using global positioning system (GPS) in real time kinematic (RTK) method where the same area that observe by using UAV photogrammetry. Based on research, the distribution of GCPs scattered and the number of GCPs increase will get low accuracy in photogrammetric mapping. In the end, this study can help to determine the suitability of the Ground Control Points (GCPs) distribution using triangulation method for topography mapping work of UAV photogrammetry method.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter presents an overview of the research background, including problem statement, significance of study, aims and objectives, research question, scope and limitations and data acquisition.

1.2 Research Background

Ground control points (GCPs) are used to georeferenced unmanned aerial vehicle (UAV) images indirectly as mentioned by Ulvi, (2021). Ferrer-González et al., (2020) stated that it is important to understand how many ground controls points (GCPs) are required and how to distribute them across the study site to ensure a given accuracy. Unmanned aerial vehicles (UAV), which were first used and developed in the military, have experienced profound changes in recent years and are increasingly being used in civilian purposes. As time running, UAV used in surveying to produce topographic map, Digital Elevation Model (DEM) map and others.

The accuracy method that used in surveys is Root Mean Square Error (RMSE) from Ground Control Points (GCP). Control point distribution for topographic map productions is necessary to get high accuracy. There are several factors that impact the accuracy of UAV photogrammetry results. The impact of the number of ground control points (GCPs) and their distribution in the study area is the most significant of all of these as mentioned by Martínez-Carricondo et al., (2018). Hilal et al., (2021) stated that Ground Control Points GCPs are the only way to get an accurate position in aerial surveying. At least three points should be used, and the model will become more precise in X, Y, and Z locations as the number increases. The precision of the 3D model generated from aerial imagery is also affected by the distribution of GCPs. In addition, in this study is to identify the accuracy of a mapping product based on control point distribution designs.

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