UNIVERSITI TEKNOLOGI MARA

ASSESSMENT OF UAVS AND GROUND SURVEY METHOD FOR ROUTE PROFILE DATA COLLECTION

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ABSTRACT

The study intends to investigate achievable accuracy that could be obtained from multi-rotor UAV data collection for the purpose of developing route profile information. To achieve the purpose, the objectives include: i) to perform UAV data collection for orthophoto generation; ii) to extract route profile information (longitudinal section) from orthophoto surface model, and iii) to compare route profile data between orthophoto and ground survey data. Data was collected both using total station and multi rotor UAV at 20 meter intervals. Ground control survey was carried out and UAV flight designed to be at 50 and 100 meters altitudes. DTM was produced from orthophoto images using Agisoft Metashape Pro and profile information extracted in ArcGIS software. The results show acceptable accuracy when compared with in-situ data, with sub centimeters levels of accuracy (in x, y and z directions) and the errors display an increasing trend with increased altitudes. Lower altitudes provides better and more accurate results for profile information data. Hence, this study could be the capstone in providing alternatives to ground survey for obtaining route information with faster method and wide area coverage.

CHAPTER ONE
INTRODUCTION

1.0 Introduction

In this chapter, there will be a discussion of the specifics of this research, which will cover the research background, the problems statement, the research questions, the aim and objectives, the area of the study, and also the significance of this study.

1.1 Research Background

According to J. J. Carrera-Hernandez (2020), as we can see, progress in surveying technology has undergone many changes over time and has improved the collection of data for the height of the land surface which can be used as a good sample from the land survey that has been measured using theodolites and Total Stations (TS) but it shows that this task only takes a long time and it also requires highly skilled and meticulous surveyors.

In the context of the planning and construction of various surveying projects for engineering routes such as roads, railways, pipelines, utilities and so on, it also requires important data to determine the alignment, grading, and quantity of earthwork. Surveying this route involves measuring and calculating horizontal and vertical angles, as well as horizontal heights and distances said M. B. Gutti and A. A. Musa (2019). So, all the results of this survey are very important and will be used to prepare a detailed plan and profile information base map on the proposed road.

In this study, the idea was given to improve in terms of data acquisition to improve the accuracy assessment of data collection by combining with the method of Unmanned Aerial Vehicles (UAV) and focusing on the determination of different height values and suitable for flying drones. Then, the collection of data from the land survey that is the route survey will be processed using CDS software while the aerial photo data will be processed through Agisoft Metashape Pro. Then, the final output of the profile information from the ground survey will be produced using AutoCAD software to generate the longitudinal section of the final drawing plan. After that, the DTM results from the UAVs process will be used in ArcGIS software to produce profile information from the same area and at the same point, which is the chainage point. From the UAV method, the information profile data obtained will be determined by analysing which the accuracy value is more suitable and has better accuracy by comparing two different data and different altitudes.

TABLE OF CONTENT