

Assessment of photogrammetric volume estimation as a method for quantifying the economically valuable industrial minerals in Sri Lanka

Rajitha Malshan Athukorala (1), Hemalal Panagoda (2), Manzul Kumar Hazarika (1), Kavinda Gunasekara (1), Sahan Rajitha Jayawardena (2)

¹ Geoinformatics Center, Asian Institute of Technology, Thailand

² Department of Earth Resources Engineering, University of Moratuwa, Sri Lanka

Email: rajitha@ait.asia

Abstract: Mining based royalty payment generates large revenue for the government of Sri Lanka. Geological Surveys and Mines Bureau (GSMB) is the regulatory body governing the mining activities in the island and responsible for royalty payment collection. The payment value is decided upon an explosive based empirical method (indirect method for volume extracted) at present which has proven to deviate from the real scenario under different circumstances and rock types.

As a solution for accurate rock volume measurement, a UAV based photogrammetric volume estimation was carried out at an “A” grade quarry in Sri Lanka. A Phantom 4 (Professional) drone attached with a polarizing lens was used for the image acquisition at different altitudes and flying modes for the optimum image collection both before and after a specific blast. The images were then processed to generate a 3D model and then compared to measure the extracted rock volumes. Rock volume was calculated using the empirical formula as well to compare with photogrammetric method to determine the deviation.

A total station survey was also carried out simultaneously, before and after the blast to estimate the time and labor (man-hours) required for conducting the survey. The blasted volume was also estimated using the specific volume of a rock sample to verify the blasted rock volume.

A comparison of the UAV based photogrammetric and traditional explosive based empirical method for volume estimation of rocks was carried for assessing the accuracy of the measurement, costs involved, time consumed, and it was found that the photogrammetric method is a far better method.

Keywords: UAV, Photogrammetry, Mining