



The mined mass measurement by using drone technology approach in the local scale mining in Tumiyang area, Kebasen District, Banyumas Regency, Central Java, the observation area of CV. Sinergi Karya Solutif

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Abstract

In this study, the objective or focal point is the number of reserves that have been mined and how to calculate the volume mined using the Unmanned Aerial Vehicle (UAV) method. In the evaluation of the volume mined using the UAV approach in Tumiyang village, Kebasen sub-district, Banyumas regency, Central Java province, this research was conducted using qualitative and quantitative methods related to the characteristics and modeling of sediment distribution from prospect block exploration. This research was conducted in the even semester of the 2020-2021 academic year, which is between October 2020 to March 2021. Based on the results of the study, it can be concluded that the data collection process using the UAV method requires a short time and complete initial information regarding the condition of the research area is very important for success. aerial photography data collection. The data obtained is aerial photo data and with supporting data such as topography and geology. Based on data processing, the mined volume obtained using supporting software is 32,313.55 m³, while the volume obtained when we calculate manually is 247,050.65 m³.

1. Introduction

CV. Sinergi Karya Solutif as an environmental observer of former community mining as a research location located in Tumiyang village, Kebasen sub-district, Banyumas regency, Central Java province. The former mine is a mining area that mines clay rocks and breccias in the research area [1]. In measuring and calculating the volumetrics of minerals, it is carried out using the UAV (Unmanned Aerial Vehicle) method or drones such as drones to obtain aerial photos, which will later become primary data used for volumetric analysis [2].

The use of UAVs is considered efficient and effective in carrying out measurements in the research area [3], [4]. In improving and obtaining maximum results, the evaluation of the mined volume uses the Unmanned Aerial Vehicle (UAV) approach in Tumiyang village, Kebasen district, Banyumas regency, Central Java province in the observation area CV. Sinergi Karya Solutif is seen as very efficient and effective.

2. Methodology

The method used in calculating the volumetric minerals is the UAV (Unmanned Aerial Vehicle) method or unmanned aircraft such as drones. Where data collection activities are carried out in the research area, namely Tumiyang Village, Kebasen District, Banyumas Regency, Central Java. The number of aerial photos taken was 43 photos and identified 37,281 photo points. After data collection is complete, it is continued with data processing activities using the photogrammetry software, converter software, mapping software, and image mapping software. The steps for data processing are as follows [5]:

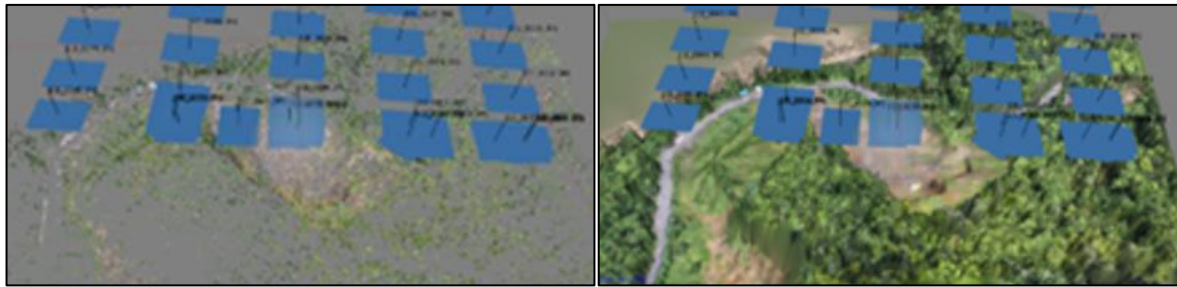


Figure 1. The result of the 3D point reconstruction by using the aligned photo (left), the result of the 3D point reconstruction by using pointed cloud analysis (right)

The creation of an aerial photo 3D model using the photogrammetry software application. Add photo is the stage of entering aerial photo data in the application. Align Photo, then click align photo [6-9]. Align Photos is a step to identify the points of each photo or combine photos based on the similarity of locations. Build Dense Cloud or Dense Point Clouds is a collection of high points in the number of thousands to millions of points generated from aerial photogrammetry processing or LIDAR. Build Mesh is the next step to combine photo dots from the dense cloud results into one field [10]. Build Texture is a 3D physical model that appears to be in the photo coverage area or a process of coloring the field according to the photo color. Build DEM (Digital Elevation Model) [11], then create a DEM model. DEM is a field result or digital field model. From DEM data, it can be derived to determine elevation, slope, aspect, the direction of irradiation, to further modeling such as cut and fill, visibility, watershed creation, and others [12].

The creation of mine opening polygons mapping software [6]. The polygons are then saved in the shapefile format. The file with the shapefile format will be used to cut the mine aperture raster and DEMNAS [13]. Based on shapefile data processed on Google Earth software, it is known that the mined surface area is 0.68 hectares. The next step is to cut the raster using the Qgis application. The reason for choosing Qgis as an alternative to raster cutting is because Qgis can cut the desired raster down to 0 masl. So that the cut raster can be processed in other data processing applications [7].

The data conversion by changing the file format to “.grd” format (ASCII Format). The data that has been cut in the Qgis application is then converted into a surfer grid format using the Global Mapper application. The data that has been converted into a surfer grid format, will then become surfer software data to determine the volume [8].

The calculation of the volume on the surface process software by inputting data through the 3D Surface tools with a grid format that has been exported from software converter [14]. Then calculate the volume of each model by entering the Grid Volume menu, then input the grid file whose volume will be calculated. At this stage, the volume calculation of the two models is carried out alternately with each constant value being 0. A value of 0 means that the volume calculation starts from elevation 0.

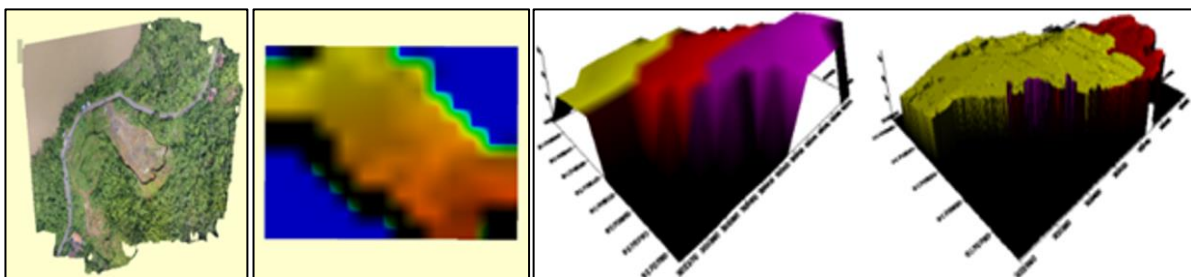


Figure 2. The generated of the orthomosaic map and the generated DEM of the study area (left), the comparison resolution of DEMNAS, and the generated DEM by photogrammetry (right).

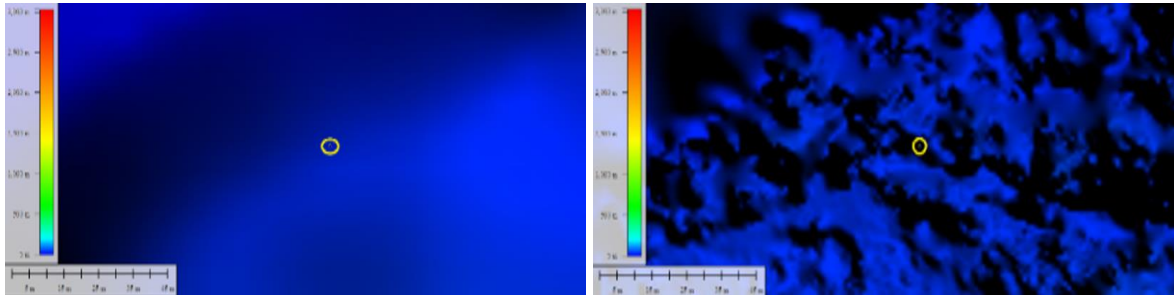


Figure 3. The elevation model comparison was derived from DEMNAS as a reference before mining activity (left) and 3D reconstructed DEM as a reference of after mining activity (right).

3. Results and discussion

The results of the calculation of the volume before mining in this case DEMNAS is 279.563,03 m³ and the volume after being mined in this case the mined DEM is 295,541.48 m³. From the results of the volume calculation, it is concluded that it is not possible to directly calculate the volume using the formula. The problem found is that the volume of DEMNAS which should be more than the volume of mined DEM is the smallest [9]. After evaluating the two data, it is known that the cause of this problem is the elevation of mined DEM (after mining) is higher than DEMNAS (before mining) [15 - 16]. At the same coordinate point, namely 109^o13'6,2136" E, 7^o29'50,4953" S. Mined DEM has an elevation of 39 m, while DEMNAS is 31 meters. The coordinates used for comparison provide evidence that the difference in elevation between Mined DEM and DEMNAS is 7 meters. The evaluation of the above problem results in a mined volume of 247,050.65 m³ where the volume of aerial photography DEM is 247,249.42 m³ with a reserve volume of 247,050.65 m³.

4. Conclusion

Based on the results of research and calculations of mined volume using the UAV (Unmanned Aerial Vehicle) method or unmanned aircraft such as drones, it can be concluded that the mined volume of CV. Sinergi Karya Solutif in Tumiyang Village, Kebasen District, Banyumas Regency, Central Java, which is 247,050.653 m³.

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