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Original Article

A Comparative Analysis of Aerial Photo Data Processing Using Agisoft Metashape Professional and WEBODM

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ABSTRAK

This study compares the results of aerial photo data processing using Agisoft Metashape and WebODM software, focusing on geometric accuracy, orthomosaic quality, and processing time. The data consisted of 504 aerial photographs captured by a WingtraOne Gen II UAV and seven Independent Check Points (ICPs). Agisoft Metashape utilized photo alignment, dense cloud generation, DEM, and orthomosaic construction, while WebODM applied auto boundary, DEM, fast orthophoto, high PC quality, and skipped 3D model generation. The geometric accuracy was evaluated using CE90 and LE90 values, and the orthophoto quality was assessed through planimetric analysis. The results showed that WebODM completed the process in 19 hours and 57 minutes, whereas Agisoft required over 3 days. Agisoft yielded better accuracy (CE90 = 0.21 m, LE90 = 0.64 m) compared to WebODM (CE90 = 0.29 m, LE90 = 0.70 m). In terms of orthophoto quality, Agisoft preserved building and bridge shapes better than WebODM.

KEYWORDS
Agisoft Metashape; WebODM; Geometric Accuracy

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INTRODUCTION

Recent trends in geospatial technology indicate a significant increase in its utilization to support various aspects of infrastructure development, particularly in the fields of roads and transportation. Geospatial technology now functions not only as a static mapping tool but has evolved into a predictive analytical system capable of optimizing the planning, monitoring, and maintenance of infrastructure in real time (Gkontzis et al., 2024). The integration of technologies such as LiDAR, drone-based photogrammetry, artificial intelligence (AI), and cloud remote sensing enables faster, more accurate, and efficient data collection, thereby supporting smarter and more sustainable infrastructure development (Alnando et al., 2022).

In the context of infrastructure projects, geospatial technology plays a crucial role in optimal route planning, traffic impact assessment, road condition mapping, and targeted maintenance planning (Jepril et al., 2025). For instance, spatial data-based road network analysis allows planners to determine the shortest and fastest routes while also predicting changes in traffic volume due to new road construction. In addition, this technology is also used for monitoring road assets such as bridges and traffic signs, as well as for disaster risk mitigation through the mapping of flood-prone or landslide-prone areas.

The Bogor–Ciawi–Sukabumi (BOCIMI) Toll Road is a strategic infrastructure project aimed at enhancing regional connectivity, reducing travel time, and supporting regional economic growth. In this project, accurate geospatial data is crucial during the planning and monitoring stages, particularly to ensure cost efficiency and technical precision. One efficient data collection method is the use of UAV-based aerial imagery, which is subsequently processed using photogrammetry software such as Agisoft Metashape (commercial) and WEBODM (open source). Agisoft Metashape is known for producing accurate data with comprehensive features, albeit at a high cost (Hartono & Darmawan, 2018), whereas WEBODM offers a free solution with quality approaching that of commercial software (Vacca, 2020; Hapriansyah & Hidayat, 2022).

Previous studies have extensively discussed comparisons of aerial photo processing software, such as between Agisoft Metashape and APS Menci (Ardiansyah et al., 2023; Sanjaya et al., 2018), Agisoft Photoscan and Pix4DMapper (Hamur et al., 2019; Agustian, 2019), as well as between WEBODM and Pix4DMapper (Hapriansyah & Hidayat, 2021). The results indicate that Agisoft excels in terms of accuracy (CE90 0.139 m; LE90 0.279 m), while WEBODM performs better in orthomosaic resolution (5.5 cm/pixel) despite having lower accuracy (CE90 1.928 m; LE90 1.195 m). Other studies have also noted that WEBODM has high potential for large-scale mapping, although it is not yet widely adopted (Burdziakowski, 2017; Patel et al., 2024). However, few studies have specifically compared Agisoft Metashape Professional and WEBODM in the context of strategic projects such as toll roads, particularly in Indonesia. Therefore, this study offers novelty by comparing the performance of the two software programs in terms of processing time, geometric accuracy based on Indonesia's Geospatial Information Agency Regulation No. 6 of 2018, and the planimetric quality of orthophotos in terms of object shape and area (Rachmanto & Ihsan, 2020).

To address this gap, the researcher conducted a comparative study aimed at evaluating the efficiency of Agisoft Metashape Professional and WEBODM in processing aerial photo data for the BOCIMI toll road project. The evaluation was carried out comprehensively based on processing time, geometric accuracy using seven Independent Check Points (ICPs), and orthophoto quality through planimetric analysis of objects in the mosaic outputs. The novelty of this research lies in its specific focus on a strategic infrastructure project in Indonesia and its use of national accuracy standards as the basis for evaluation. As such, the findings may serve as practical guidance for government agencies and practitioners in selecting aerial photo processing software that is both efficient and appropriate for projects of similar scale and complexity.

METHOD

Research Location

Research Location This research was conducted in the Bogor-Ciawi–Sukabumi Toll Road (BOCIMI) project area, Bogor City, West Java Province. The road section that is the object of observation is about 4.3 km long with an area coverage of ±7.3 km^2. This location was chosen because the toll road project is part of the national strategic infrastructure that requires the support of accurate geospatial data, both in the planning and supervision stages. The location of the research can be seen in Figure 1.

Research Approach

The approach employed in this study is a descriptive comparative quantitative approach. This approach aims to compare the efficiency of two aerial photo data processing software applications, namely Agisoft Metashape Professional as commercial software and WEBODM as open-source software. This method allows for objective measurement and evaluation of aerial image processing results based on three main indicators: processing time, geometric accuracy, and orthophoto quality. The selection of this approach is based on the need for numerical analysis that aligns with the objectives of the research.

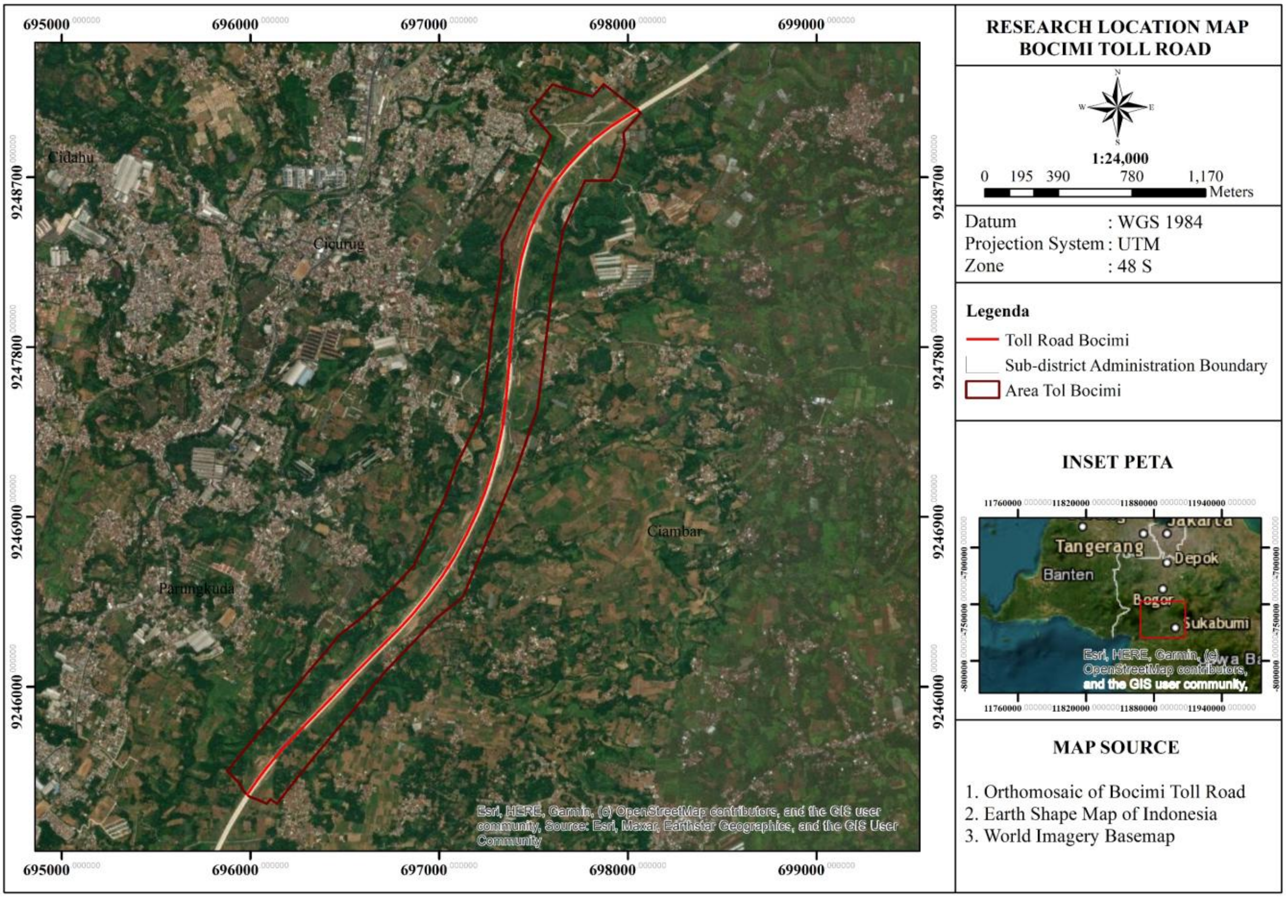

Figure 1. Research Location Map

Research Procedure

The research stages include preparation, data collection, data processing using two different software programs, and result analysis. A total of 504 aerial images were obtained using the WingtraOne Gen II drone equipped with PPK technology, along with geotagged data and seven ground control points (Independent Check Points). Processing with Agisoft Metashape involved the following steps: align photos, build dense cloud, build DEM, and build orthomosaic. Processing with WEBODM was conducted using settings such as auto boundary, DEM, fast orthophoto, optimized disk space, high PC performance quality, and skipping the 3D model generation. The research flowchart is presented in Figure 2.

Data Collection Instruments

The instruments used in this study consist of both hardware and software. The hardware includes an Asus VivoBook Max laptop with 20 GB of RAM and an AMD A6-9220 processor, used to perform data processing tasks. The software includes Agisoft Metashape Professional and WEBODM for aerial photo processing, Global Mapper for determining planimetric points, Microsoft Excel for calculating CE90 and LE90, and Microsoft Word for report writing. These instruments were selected due to their compatibility with the processing and data analysis requirements in the context of aerial photo mapping.

Table 1. Materials and Data Table

Software	Data Type
Agisoft Metashape Professional	Aerial Photos, ICP Points, BOCIMI Geotags
WEBODM	Aerial Photos, ICP Points, BOCIMI Geotags
QGIS	ICP Points, Orthophoto Points

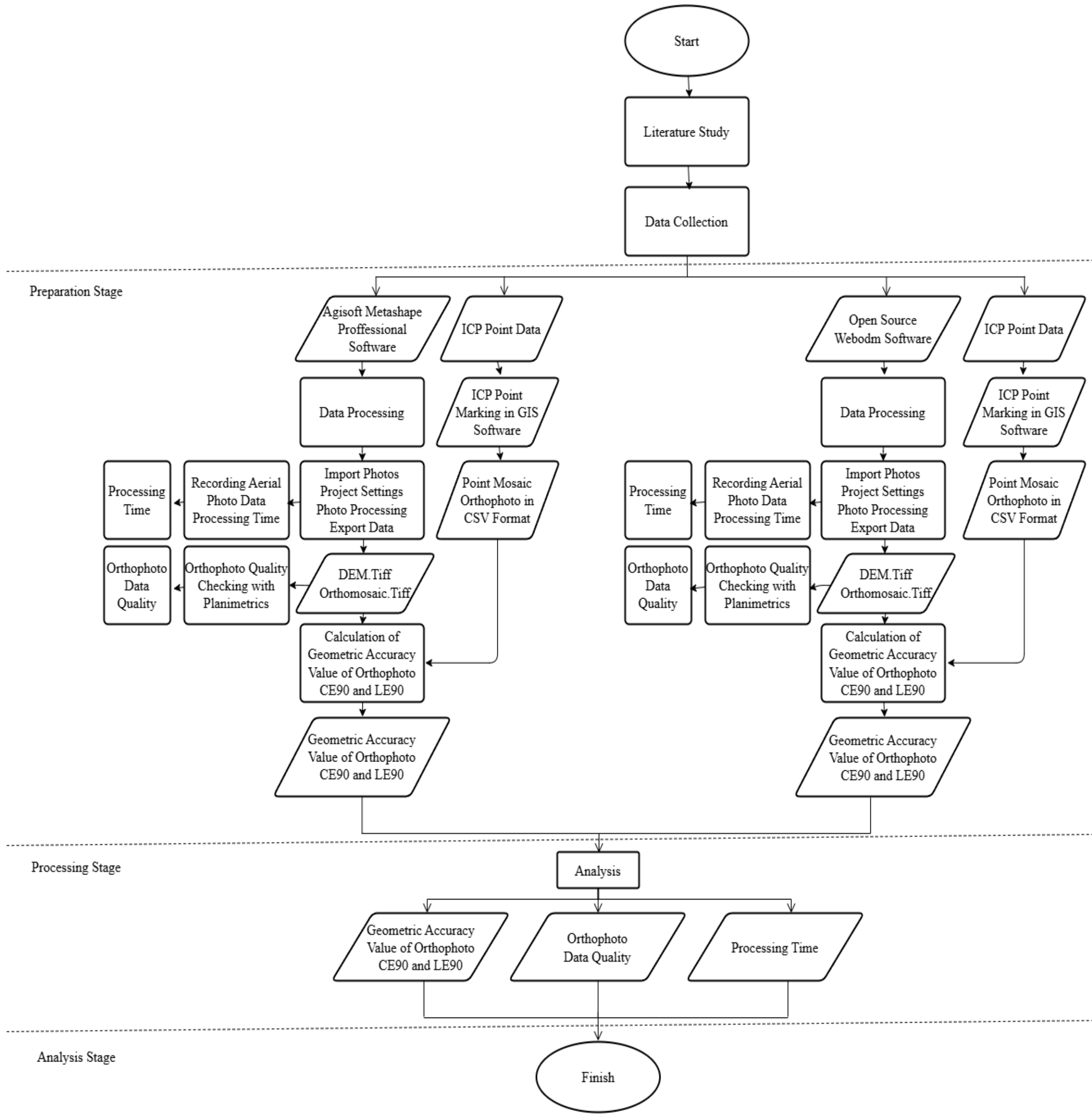

Figure 1. Flowchart

Data Analysis

The analysis was conducted in three main stages. First, processing time was recorded using the processing time/log file from each software to measure the efficiency of the process. Second, geometric accuracy was analyzed by comparing the processed coordinates with the ICP points using the RMSE method, followed by calculating the CE90 and LE90 values based on the Regulation of the Head of the Geospatial Information Agency Number 6 of 2018 (Regulation of the Geospatial Information Agency Number 6 of 2018 on the Amendment to Regulation Number 15 of 2014 on Technical Guidelines for Base Map Accuracy, 2018). Third, orthophoto quality was analyzed planimetrically by observing the shape and area of objects (buildings and bridges) using Global Mapper software. The results of these three indicators were compared to assess the effectiveness of both software applications in photogrammetric data processing.

RESULTS AND DISCUSSIONS

This study compares the results of aerial photo data processing using Agisoft Metashape and WEBODM software based on three main aspects: processing time, geometric accuracy, and orthophoto quality. The dataset consisted of 504 aerial photographs captured by the WingtraOne Gen II drone. These images were processed using two separate workflows, each aligned with the settings of the respective software. Based on the results, the total processing time using Agisoft Metashape was approximately 3 days, 10 hours, 17 minutes, and 47 seconds, involving the steps of aligning photos, building the dense cloud, generating the DEM, and creating the orthomosaic. In contrast, the processing using WEBODM required approximately 19 hours, 57 minutes, and 20 seconds, with configurations including auto boundary, DEM, fast orthophoto, optimized disk space, high PC quality, and skipping the 3D model generation. A comparison of processing times between the two software applications is presented in Table 2.

Table 2. Comparison of Processing Time between Agisoft Metashape Professional and WEBODM

Software	Processing Stages	Processing Output	Time
Agisoft Metashape	Align Photos, Dense Cloud, Build DEM, Build Orthomosaic	486,207 points; 820,141,991 points; resolution 5 cm/pixel	± 3 days 10 hours 17 minutes 47 seconds
WEBODM	Auto Boundary, DEM, Fast-Orthomosaic, Optimize Disk Space, PC Quality High, Skip 3D Model	630,579 points; resolution 5 cm/pixel	± 19 hours 57 minutes 20 seconds

WEBODM proved to be significantly more efficient in processing time, requiring only about 20 hours compared to more than 3 days with Agisoft. This finding is supported by Hapriansyah & Hidayat (2021; 2022), who stated that WEBODM excels in time efficiency, although its geometric accuracy is slightly lower. This aligns with the nature of WEBODM as an open-source software developed for ease and speed of processing, albeit with simpler features compared to Metashape (Ipate et al., 2024; Agustina, 2021).

Table 3. Comparison of Geometric Accuracy (CE90 and LE90) Between Agisoft Metashape and WEBODM

Results	Agisoft Metashape	WEBODM
CE90	0,21 meter	0,29 meter
LE90	0,64 meter	0,70 meter
Map Acuracy CE90	1:1.000 / Kelas 1	1:1.000 / Class 1
Map Acuracy LE90	1:2.500 / Kelas 2	1:2.500 / Class 2

Geometric accuracy was assessed by comparing the coordinate differences between the processed output and seven Independent Check Points (ICP). Results show that Agisoft achieved a CE90 of 0.21 meters and an LE90 of 0.64 meters, while WEBODM achieved a CE90 of 0.29 meters and an LE90 of 0.70 meters. Based on Regulation of the Head of BIG No. 6 of 2018, both results fall within the classification for large-scale mapping. The details are presented in Table 3.

The results of this study reinforce previous findings that Agisoft Metashape has superior accuracy compared to open-source software like WEBODM. A study by Fransisca Dwi (2021) reported an RMSEr of 0.056 m for Agisoft Metashape, which is better than Pix4DMapper's RMSEr of 0.063 m, with both meeting the ASPRS standards for Class III orthophotos (Agustina, 2021a). Other research also confirms that Metashape excels in producing high-accuracy 3D models and orthophotos in both urban and exurban environments (H & Rostami, 2022). These results align with studies by Diodemus et al. (2020) and Ardiansyah et al. (2023), which state that Agisoft is more precise in CE90 and LE90 values compared to other software.

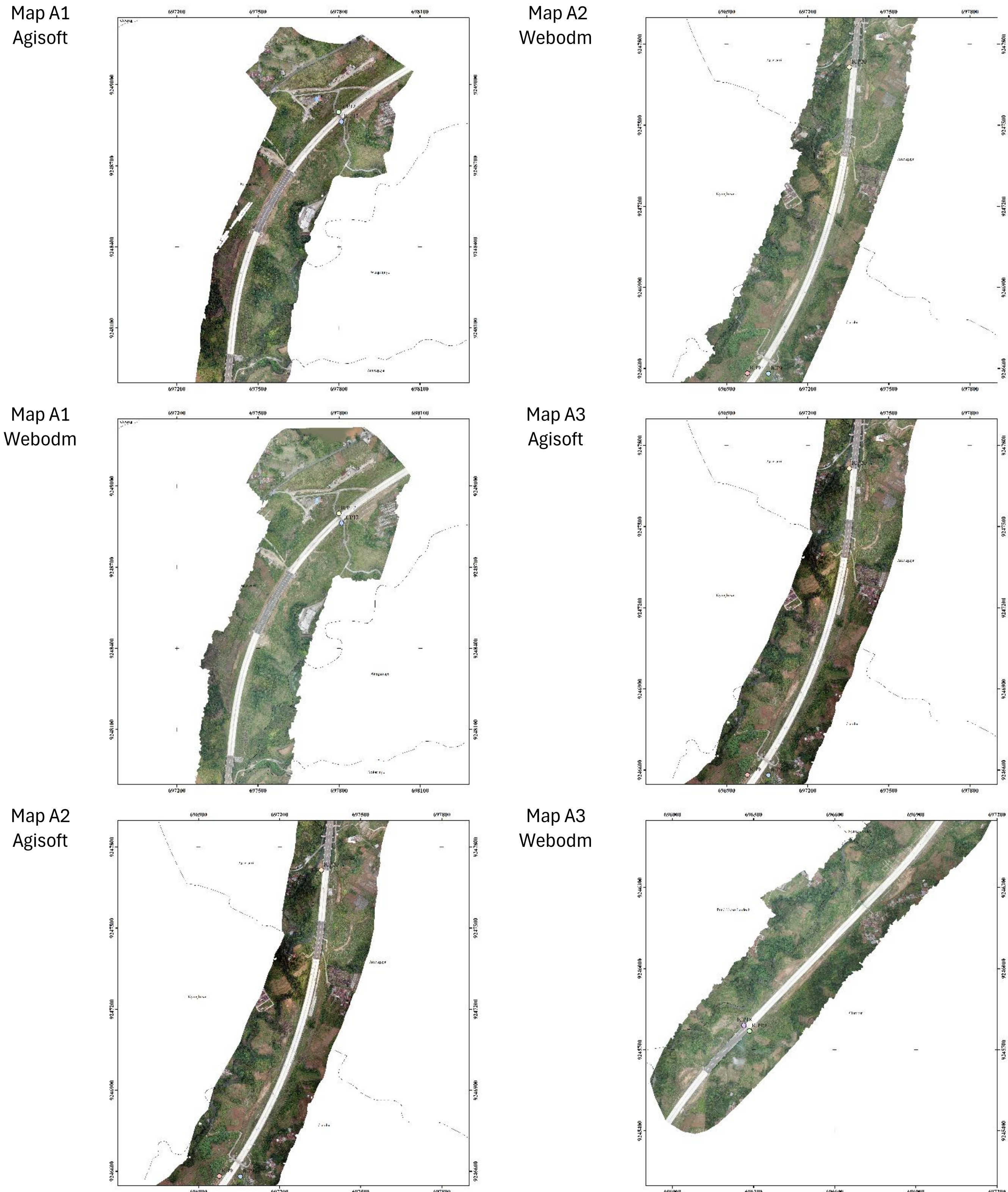

Figure 3. Orthophoto Visualization of Agisoft Metashape Professional and WEBODM

The orthophoto quality was analyzed planimetrically by assessing the shape and area of objects in the mosaic results, specifically two bridges and two buildings. The output from Agisoft showed more stable object shapes that closely matched the actual geometry. In contrast, the WEBODM results exhibited irregular shapes, especially in building objects. The comparison is presented in Table 3.

Table 4. Comparison of Orthophoto Quality Based on Planimetric Shape and Perimeter

Object Name	Shape/Perimeter (Agisoft)	Shape/Perimeter (WEBODM)
Bridge 1	Rectangle – Perimeter: 116.57 meters	Rectangle, irregular – Perimeter: 116.15 meters
Bridge 2	Rectangle – Perimeter: 335.23 meters	Rectangle, irregular – Perimeter: 335.65 meters
Building 1	Square – Perimeter: 129.29 meters	Parallelogram – Perimeter: 133.85 meters
Building 2	Square – Perimeter: 103.93 meters	Parallelogram – Perimeter: 95.10 meters

The quality of orthophotos is greatly influenced by the reconstruction algorithms and point cloud processing techniques. Agisoft Metashape employs more advanced depth map and mesh-refinement techniques, resulting in orthophotos with more stable and precise object shapes (H & Rostami, 2022). Meanwhile, WEBODM, although effective for rapid mapping, still faces challenges in maintaining the accuracy of object shapes, especially in areas with complex geometries (Putra et al., 2023). Research by Putra, W. B. et al. (2023) emphasizes that the quality of DSM and orthophotos heavily depends on the accuracy of the digital surface model generated by the software. The visualization of orthophoto object shapes from Agisoft and WEBODM is presented in Table 5.

These findings align with Petrus et al. (2019), who showed that Agisoft outperforms Pix4DMapper in terms of CE90 and LE90 values. Furthermore, research by Ardiansyah et al. (2023) indicates that Agisoft excels in orthophoto visualization compared to APS Menci. However, regarding time efficiency, this study supports the conclusions of Hapriansyah and Hidayat (2021; 2022), who stated that WEBODM is more efficient in processing time despite having lower accuracy.

Thus, the choice of aerial photo processing software largely depends on priority needs. If high accuracy and precise orthophoto shapes are required, Agisoft is more recommended (Tjiong et al., 2021). However, if time efficiency and resource considerations are the main factors, WEBODM is a viable alternative.

CONCLUSION

The results of the study comparing aerial photo data processing using Agisoft Metashape Professional software and the open-source software WEBODM can be summarized as follows:

1. WEBODM is more time-efficient, completing the processing in approximately 19 hours 57 minutes 20 seconds, whereas Agisoft Metashape Professional requires significantly longer processing time, approximately 3 days 10 hours 17 minutes 47 seconds.
2. Agisoft Metashape Professional demonstrates better geometric accuracy compared to WEBODM, with CE90 at 0.21 meters and LE90 at 0.64 meters, while WEBODM has a CE90 of 0.29 meters and LE90 of 0.70 meters. The geometric accuracy of both software results falls within a horizontal scale of 1:1,000 and a vertical scale of 1:2,500.
3. The orthophoto quality produced by Agisoft Metashape Professional is superior in terms of planimetric accuracy compared to WEBODM.
4. Both Agisoft Metashape Professional and WEBODM show good geometric accuracy, but Agisoft Metashape outperforms in planimetric data quality, especially regarding object shape and area.
5. This study has several limitations, including the limited number and variety of aerial photo data used, which means the results may not represent all diverse field conditions. Additionally, testing was conducted on only one hardware specification (computer), so the performance of both software on devices with different specifications remains unknown. Orthophoto quality assessment was also limited to planimetric aspects and did not deeply analyze radiometric or visual quality.
6. Based on these limitations, it is recommended for future research to use aerial photo data with a wider variety of locations, resolutions, and terrain conditions to obtain more representative results. Furthermore, testing should be conducted on multiple hardware specifications to understand their impact on processing time and final output. Future studies could also include analysis of orthophoto quality from other aspects, such as radiometric and visual quality, and test integration of processing results with other mapping applications to broaden the research benefits.

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Conflict of Interest: The authors declare that there are no competing interests relevant to the content of this article.

REFERENCES

Agustian, L. (2019). Pembuatan Peta Orthophoto Dan Dem Menggunakan Dua Software Pengolahan Foto Udara Dari Data Hasil Pemotretan Unmanned Aerial Vehicle. *Reka Geomatika: Jurnal Institut Teknologi Nasional*. Https://Www.Scribd.Com/Document/432723106/232015002-Lendra-Agustian-Perbandingan-Software-Pix4d-Dengan-Agisoft

Agustina, F. D. (2021a). Evaluasi Uji Perbandingan Ketelitian Pada Orthophoto Berdasarkan Standar Asprs. *Elipsoida*, *Vol 4 No 1*, 16–26. Https://Ejournal2.Undip.Ac.Id/Index.Php/Elipsoida/Article/Download/11015/6300

Agustina, F. D. (2021b). Evaluasi Uji Perbandingan Ketelitian Pada Ortofoto Berdasarkan Standar Asprs. *Elipsoida : Jurnal Geodesi Dan Geomatika*, *4(01)*, 16–26. Https://Doi.Org/Https://Doi.Org/10.14710/Elipsoida.2021.11015

Alnando, N., Tjahjadi, M. E., & Suhari, K. T. (2022). Komparasi Model 3d Jembatan Dari Pemotretan Konvergen Dan Normal Menggunakan Drone. *Jambura Geoscience Review*, *Vol. 4*, *No 2*, 123–135. Https://Doi.Org/Https://Doi.Org/10.34312/Jgeosrev.V4i2.13437

Ardiansyah, Suryalfihra, S. I., Arifin, D., & Prasetya, F. V. A. S. (2023). Perbandingan Pengolahan Data Foto Udara Menggunakan Perangkat Lunak Agisoft Metashape Professional Dan Apsmenci. *Journal Of Geomatics Engineering, Technology, And Sciences (Jgets)*, *01*, 42–49. Https://Doi.Org/Https://Doi.Org/10.51967/Gets.V1i2.20

Burdziakowski, P. (2017). Evaluation Of Open Drone Map Toolkit For Geodetic Grade Aerial Drone Mapping – Case Study. *17 International Multidisciplinary Scientific Geoconference Sgem 2017 :Informatics, Geoinformatics And Remote Sensing*, 23, Article 23. Https://Doi.Org/Https://Doi.Org/10.5593/Sgem2017/23/S10.013

Diodemus, P., Wahyono, E. B., & Sufyandi, Y. (2020). Analisis Pemanfaatan Foto Udara Hasil Pemotretan Unmanned Aerial Vehicle (Uav) Tipe Post-Processed Kinematic (Ppk) Untuk Pemetaan Topografi. *Seminar Nasional Geomatika 2020: Informasi Geospasial Untuk Inovasi Percepatan Pembangunan Berkelanjutan*, 886. Https://Doi.Org/10.24895/Sng.2020.0-0.1204

Gkontzis, A. F., Kotsiantis, S., Feretzakis, G., & Verykios, V. S. (2024). Enhancing Urban Resilience: Smart City Data Analyses, Forecasts, And Digital Twin Techniques At The Neighborhood Level. *Future Internet*, *16(2)*, 47. Https://Doi.Org/Https://Doi.Org/10.3390/Fi16020047

H, E., & Rostami, S. G. (2022). Analysis And Comparison Of The Exactness Of Specialist Drone-Based Software Products In Urban And Exurban Region. *Scientific- Research Quarterly Of Geographical Data (Sepehr)*, *31(123)*, 63–87. Https://Doi.Org/Https://Doi.Org/10.22131/Sepehr.2022.699908

Hamur, P. K., Tjahjadi, E., & Yuliananda, A. (2019). Kajian Pengolahan Data Foto Udara Menggunakan Perangkat Lunak Agisoft Photoscan Dan Pix4d Mapper (Studi Kasus: Kecamatan Lowokwaru, Kota Malang). *Jurnal Itn Malang*, 5. Https://Eprints.Itn.Ac.Id/3961/

Hapriansyah, S. A., & Hidayat, H. (2021). Analisis Perbandingan Ketelitian Hasil Orthomosaic Menggunakan Perangkat Lunak Komersial Pix4dmapper Dan Open Source Webodm Drone.

Jurnal Teknik Its, *10*, A345. Https://Pdfs.Semanticscholar.Org/0e04/Ed1269eb56ae7700d444dfcd451ff6f9c6cf.Pdf?_Gl=1*Jrf7ay*_Ga*Mtczmji2mzcylje2otk1mtexnjg.*_Ga_H7p4zt52h5*Mtcxndc0ntg1nc4yljeumtcxndc0ntg4ni4yoc4wlja.

Hapriansyah, S. A., & Hidayat, H. (2022). Analisis Pembuatan Peta Orthomosaic Menggunakan Perangkat Lunak Open Source Webodm. *Journal Of Geodesy And Geomatics*, *1*, 136–144. Https://Doi.Org/Http://Dx.Doi.Org/10.12962/J24423998.V18i1.10479

Hartono, D., & Darmawan, S. (2018). Pemanfaatan Unmanned Aerial Vehicle (Uav) Jenis Quadcopter Untuk Percepatan Pemetaan Bidang Tanah (Studi Kasus: Desa Solokan Jeruk Kabupaten Bandung). *Reka Geomatika: Jurnal Institut Teknologi Nasional*, Hlm. 31. Https://Eprints.Itenas.Ac.Id/1983/1/Soni Darmawan - 12.Pdf

Ipate, G., Tudora, C., & Illie, F. (2024). Digital Analysis With The Help Of An Integrated Uav System For The Surveillance Of Fruit And Wine Areas. *Agriculture*, *14(11)*. Https://Doi.Org/Https://Doi.Org/10.3390/Agriculture14111930

Jepril, Melo, R. H., Pambudi, M. R., & Asrul. (2025). Kajian Geospasial Untuk Pengembangan Fasilitas Pendukung Destinasi Wisata Di Gorontalo: Literatur Review. *Jurnal Riset Dan Pengabdian Interdisipliner*, *Vol. 2*, *No*, 362–368. Https://Doi.Org/Https://Doi.Org/10.37905/Jrpi.V2i2.31498

Patel, S., Chintanadilok, J., Hall-Scharf, B., Zhuang, Y., Strickland, J., & Singh, A. (2024). Webodm: An Open-Source Alternative To Commercial Image Stitching Software For Uncrewed Aerial Systems. *Uf/Ifas University Of Florida*. Https://Doi.Org/Https://Doi.Org/10.32473/Edis-Ae593-2024

Peraturan Badan Informasi Geospasial Nomor 6 Tahun 2018 Tentang Perubahan Atas Peraturan Kepala Badan Informasi Geospasial Nomor 15 Tahun 2014 Tentang Pedoman Teknis Ketelitian Peta Dasar, Pub. L. No. Perka Big No. 6 Tahun 2018 (2018). Https://Jdihn.Go.Id/Files/217/27330968

Putra, W. B., Faisal, G., Dewi, N. I. K., & Firzal, Y. (2023). Unmanned Aerial Vehicle (Uav) Photogrammetry For Heritage Building Documentation: Case Study Sasaksaat Train Station, Bandung, Indonesia. *International Journal Of Environment, Architecture, And Societies*, *3(02)*, 72–86. Https://Doi.Org/Https://Doi.Org/10.26418/Ijeas.2023.3.02.72-86

Rachmanto, D. H., & Ihsan, M. (2020). Pemanfaatan Metode Fotogrametri Untuk Pemetaan Skala 1 : 1000 (Studi Kasus : Universitas Pendidikan Indonesia). *Jurnal Enmap (Environment & Mapping)*, *1*.

Sanjaya, T. S. S., Handayani, W., & Widartono, B. S. (2018). Perbandingan Software Agisoft Photoscan, Pix4d, Dan Aps Menci Untuk Pemrosesan Data Foto Udara Menjadi Orthophoto Dan Digital Surface Model. *Universitas Gadjah Mada*. Https://Etd.Repository.Ugm.Ac.Id/Penelitian/Detail/165384

Tjiong, Dinoto, S., Prasetyo, Y., & Bashit, N. (2021). Analisis Pemodelan 3 Dimensi Pada Metode Close Range Photogrammetry Menggunakan Free And Open Source Software. *Jurnal Geodesi Undip*, *Volume [10*, 216–223. Https://Doi.Org/Https://Doi.Org/10.14710/Jgundip.2021.29705

Vacca, G. (2020). Web Open Drone Map (Webodm) A Software Open Source To Photogrammetry Process. *Fig Working Week 2020. Smart Surveyors For Land And Water Management*. Https://Iris.Unica.It/Handle/11584/300743#