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Aerial Photography in Malaysia: Technological Advancements and Applications

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ABSTRACT

Aerial photography is gaining popularity among Malaysian photographers and professionals, offering unique perspectives and stunning aerial views made possible by drone technology. This study explores the benefits, challenges, and future potential of aerial photography in Malaysia, contributing to discussions on sustainable development and technological innovation. By analyzing relevant case studies and conducting a thorough literature review, the research provides a comprehensive understanding of technical advancements and diverse applications in this field. It also examines how industries such as agriculture, urban planning, and environmental monitoring have integrated aerial photography into their practices. Additionally, the study addresses regulatory and ethical considerations, offering insights into the challenges and opportunities of drone usage. Through this approach, the research highlights the significant potential of drone technology in Malaysia's aerial photography sector, particularly in capturing the dynamic interplay between rural and urban landscapes.

Keywords: aerial photography, applications, Malaysia, technology.

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Fotografi Udara di Malaysia: Kemajuan Teknologi dan Aplikasi

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ABSTRAK

Fotografi udara kini semakin mendapat tempat dalam kalangan jurugambar dan profesional di Malaysia. Dengan kemajuan teknologi dron, ia bukan sekadar merakam keindahan alam dari perspektif unik, tetapi juga membuka peluang baharu dalam pelbagai bidang. Kajian ini memberi tumpuan kepada manfaat, cabaran, serta potensi masa depan fotografi udara di Malaysia, khususnya dalam menyokong Pembangunan aplikasi lestari dan inovasi teknologi. Melalui kajian kes dan tinjauan literatur, penyelidikan ini mengupas bagaimana fotografi udara telah dimanfaatkan dalam pelbagai sektor. Di bidang pertanian, dron digunakan untuk pemantauan tanaman, membantu petani meningkatkan hasil dan mengurangkan kos operasi. Dalam perancangan bandar, teknologi ini menyumbang kepada pemetaan yang lebih terperinci, membolehkan pembangunan infrastruktur yang lebih sistematik. Manakala dalam pemantauan alam sekitar, fotografi udara berperanan dalam pemetaan hutan serta pemantauan pencemaran. Selain itu, kajian ini turut meneliti aspek peraturan dan etika dalam penggunaan dron, termasuk cabaran berkaitan keselamatan dan privasi. Dengan pendekatan yang menyeluruh, kajian ini bukan sahaja menyoroti kelebihan teknologi dron dalam fotografi udara, tetapi juga membuka ruang perbincangan mengenai cara terbaik menggunakannya demi manfaat masyarakat dan pembangunan negara.

Kata Kunci: aplikasi, fotografi udara, Malaysia, teknologi.

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1.0 Introduction

Chandi (2024) stated that in the ongoing evolution of technological advancements, several key players have emerged, each making unique contributions to the field of photography. Among these, drones have significantly transformed perspectives by providing aerial views. These capabilities have elevated real estate photography and environmental monitoring, turning them into visually immersive and dynamic experiences. In Malaysia, the rapid development of drone technology and its diverse applications have transformed the field, making aerial photography more accessible and cost-effective (Aerologix, 2024). High-resolution imaging and state-of-the-art drones now allow for the capture of stunning visuals and valuable data, which are increasingly used in precision farming, urban planning, and environmental monitoring. These technologies enable more efficient resource management and informed decision-making. This study explores aerial photography's technological advancements and applications in Malaysia, focusing on its benefits, challenges, and future potential. By analysing relevant case studies, the research aims to contribute to discussions on sustainable development and technological innovation in the country.

2.0 Background of Study

Aerial photography has a long history, beginning in the early 20th century with military mapping and reconnaissance. In Malaysia, it was first used in the mid-20th century for land surveying and topographic mapping. Technological advancements, such as high-definition cameras, real-time data transmission, and Geographic Information Systems (GIS), have revolutionised the field (Viper Drones, 2023). Drones, in particular, have made aerial photography more versatile by capturing images from high and low altitudes, offering previously unattainable perspectives. This study focuses on the challenges and opportunities of aerial photography in Malaysia, particularly in sustainable development. It examines how photographers use drone technology to document urban, rural, and natural landscapes while addressing regulatory, ethical, and technical challenges. The research also highlights opportunities for innovation, such as documenting environmental changes and promoting cultural heritage, to support sustainable development goals.

2.1 Historical Evolution

Malaysia has used aerial photography since the early 1900s for colonial mapping and resource discovery. During World War II, it was critical to military operations, providing comprehensive imagery for strategic planning and intelligence. For example, during "Operation Firedog" (1947-1949), Williams-Hunt, an Aborigine Advisor in Malaysia, photographed roughly 2,632 aerial photos (Figure 1) of Peninsular Malaysia (Moore, 2009). Following independence, Malaysia's government recognised the importance of aerial photography in national development, notably infrastructure planning and natural resource management.

Photogrammetry developments in the 1960s and 1970s improved topographical map accuracy and detail, allowing for more efficient urban planning and land management. The development of colour infrared film in the 1980s broadened aerial photography's applications, particularly in environmental monitoring, by boosting the capacity to distinguish vegetation species and measure their health.

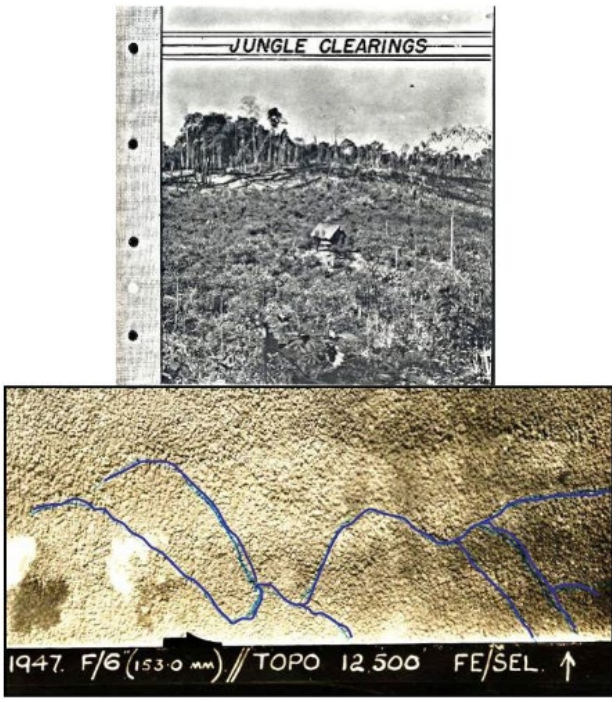

Figure 1: Jungle Clearings, Cover Photo by H.D. Collings, Raffles Museum, Singapore. The image is noted as Ulu Bera, Pahang, with last year's tapioca in the foreground, a new feeling burnt off but not yet planted in the background and the 'Virgin jungle' rising in the rear. On the bottom details aerial photograph of the southeast region showing annotations by Williams-Hunt taken August 29, 1947 (Moore, 2009)

2.2 Technological Advancements

Over the past two decades, aerial photography has advanced significantly due to digital imaging, GIS, and Unmanned Aerial Vehicles (UAVs). Drones have democratised aerial photography, making it accessible to a wider range of users (Gohari et al., 2022). Equipped with advanced sensors and cameras, drones can capture high-resolution images in hard-to-reach areas (Aonic, 2024). These technologies have enhanced efficiency, reduced costs, and improved accuracy in various industries. In Malaysia, drones are increasingly used for precision farming, urban planning, and environmental monitoring, offering new perspectives and solutions for sustainable development. Have we ever desired to obtain an aerial perspective of your preferred urban area, shoreline, or structure? Specialised aerial drones dedicated to photography provide a unique viewpoint of any preferred destination. Choudhary (2023) said with the continuous advancement of technology, drone photography has surpassed the limitations of the sky and is now simply the starting point for its potential.

2.3 Applications in Malaysia

In Malaysia, drones are no longer seen merely as recreational gadgets but as valuable tools for business and research (Boey, 2021). Aerial photography is widely used in environmental monitoring to assess deforestation, track wildlife habitats, and monitor land-use changes. In urban planning, it aids in designing efficient transportation systems and managing urban growth. In agriculture, it

supports precision farming by analysing crop health and soil conditions. Additionally, aerial photography plays a crucial role in disaster management, providing real-time data for emergency response and recovery efforts.

Choo (2021) interviewed the renowned photojournalist David ST Loh, well-known for producing iconic and engaging photographs. When questioned about his attraction to drone photography (Fig. 2 & 3), Loh responded as follows:

> *We consistently embrace cutting-edge technology, and the utilisation of drones has provided us with a fresh outlook on image capturing." As a photojournalist with experience in underwater photography, I have discovered that drones serve as an additional photographic instrument that enables us to create breathtaking and thought-provoking photographs, even in regions that are otherwise inaccessible. Photographing with a drone always entails an element of surprise. One cannot predict what they may catch until they view the files; it may be a collection of colours formed by the roofs, intricate designs made by the tree tops, or even an eagle swiftly passing by the drone*!

Figure 2: Paddy fields in Sekinchan. Photographed by David ST Loh (Choo, 2021).

Figure 3: A community of Melanau celebrates their Thanksgiving festival called Kaul at the mouth of the Mukah river in the Malaysian Borneo state of Sarawak. Photographed by David ST Loh (Choo, 2021).

2.4 Challenges and Regulatory Framework

This study critically examines the relationship between privacy concerns and the advantages of drone-based surveillance, especially regarding urban planning and environmental monitoring. Aerial photography has exceptional benefits, including precise mapping, effective resource management, and instantaneous data acquisition. However, it also presents considerable ethical and legal dilemmas.

In Malaysia, the rising urbanisation and environmental conservation challenges have ignited discussions on the implications of drone surveillance on personal privacy rights and data security. For example, Drone Academy Asia (2023) points out that one of the most significant public concerns surrounding drone technology is its potential for misuse. A minority of drone operators exploit this technology for personal gain, engaging in activities such as trespassing into private residential areas or conducting unauthorised surveillance to collect data without consent.

The Civil Aviation Authority of Malaysia (CAAM) regulates drone usage to ensure safety and privacy (UAV Coach, 2024). Key restrictions include altitude limits, visual line-of-sight requirements, and mandatory permits for commercial operations. These regulations aim to balance the innovative potential of drones with the need to protect public safety and privacy. Below are the main restrictions that one must be aware of when flying a drone in Malaysia, as highlighted by UAV Coach (2024) through their study and analysis of the legislation.

I. Drones are prohibited from being operated in Class A, B, C, or G airspace, within an airport traffic zone, or at an altitude exceeding 400 feet above the ground.
II. Drone operators are required to maintain an unobstructed visual connection with their drones while carrying out tasks.
III. Commercial drone operations require prior authorisation from the CAAM.
IV. Any drones weighing in excess of 20 kilogrammes (44 pounds) are prohibited from being flown unless authorised by the CAAM.

3.0 Methodology

This study employs qualitative methods and pieces of literature review to provide a comprehensive analysis. These methodologies examined aerial photography's historical development, current state, and technological advancements.

3.1 Literature Review

The exact timeline for the commercial use of drones in Malaysia is unclear. However, it is widely believed that the first commercial drones were introduced around 2009, primarily for aerial photography and surveying purposes. Since then, the drone demand in Malaysia has increased with the debut of the DJI Phantom 1 and 2 (around 2013 and 2014). Initially, Tan (2022) implied drones are valuable for photography, cinematography, and racing; however, their

adoption in Malaysia remains limited. This may be due to high ownership costs or limited awareness of relevant regulations. Nevertheless, Drone Laws (2025) justified that drone usage is permitted in Malaysia under the regulations set by the Civil Aviation Authority of Malaysia (CAAM). Apart from that, Drone Made (2018) stated Malaysia maintains a distinction between recreational and commercial drone usage, both of which are subject to regulations and a code of conduct. Furthermore, drones are subject to specific regulations that are contingent upon their weight and intended flight location. A Bernama (2024) article indicates that drone technology allows several Malaysian government departments to oversee environmental preservation, wildlife in conservation zones, and forest encroachment. Lux Metal (2024) claimed that the Malaysian construction sector has undergone substantial technological advancements, with drones contributing to increased productivity, safety, and cost efficiency. Malaysia has a rich cultural heritage and different landscapes. Its jungles and cities provide ideal conditions for recording high-quality drone footage and photos (Band, 2022), as it emerged as a strong attraction for aerial photography enthusiasts. In support of this, Adobe (2025) outlined that drones have revolutionised the field of photography by providing distinctive perspectives and compositions through their quadcopter design, which were previously either unattainable or prohibitively expensive for the majority of photographers.

This proves Malaysia is a pioneering nation in the Southeast Asian region in the adoption of drone technology, with a rise in utilisation among the younger generation and educational institutions that employ drones for research purposes (Malay Mail, 2024).

3.2 The significance of the recent development of drone technology for aerial photography

Table 1: Benefits of Drone Technology

Benefits	Justification
Photo Enhancing	Possesses the capacity to enhance precision in site monitoring by swiftly gathering substantial quantities of picture or photographic data on-site.
Higher Detail	The site development images offer a higher level of detail compared to 'Google Earth' or 'Google Street View' due to the drone's typical altitude of 100 metres above the ground (adjusted for any obstacles present).
Obstacles Challenge Navigation	Drone technology possesses the capability to navigate challenging and uneven landscapes in order to gather data, including areas such as swamps, hills, dams, rural regions, and forests. Furthermore, the drone technology possesses the capability to manoeuvre into confined spaces.

As shown in Table 1, drone technology offers significant advantages over traditional methods, including enhanced precision, higher detail, and the ability to navigate challenging terrains (Asniza Md Yunus, 2020). In Malaysia, drones are used in agriculture, forestry, disaster management, and infrastructure monitoring, demonstrating their potential for sustainable development (Abdul Aziz Ab Rahman, 2019).

3.3 Case Studies

Case studies highlight the use of aerial photography in Malaysia, such as monitoring urban green spaces (Junainah Abu Kasim, 2019) and documenting environmental changes. These examples illustrate the innovative applications of drone technology and its impact on various sectors. For instance, in Figure 4, Mohammad Firdaus Azman (2023) used a DJI Mavic Mini drone (Figure 5) to capture Malaysia's diverse landscapes, showcasing its potential for artistic and environmental documentation.

Figure 4: The Harbour of Kuala Sepetang Charcoal Factory. Photographed by Mohammad Firdaus Azman. 2022.

Figure 5: DJI Mavic Mini drone (Amazon, 2024)

3.4 Statistics of aerial photography enthusiasts and professionals in Malaysia

The aerial photography industry in Malaysia is expanding rapidly due to advancements in drone technology and growing interest among both professionals and enthusiasts. Social media platforms, particularly Facebook, serve as key hubs for this community. For instance, the "Malaysia Drone

Photography" Facebook group (Fig. 6 & 7), established in March 2022, has attracted over 27,000 members who actively share aerial imagery, experiences, and technical insights (Facebook, 2024). Additionally, local organisations and associations host regular events, including photowalks and workshops, to enhance participants' skills and provide opportunities for knowledge exchange. These sessions often feature expert-led training to improve technical proficiency. DJI Academy (2024), for example, offers structured programs where participants receive hands-on instruction from experienced aerial photographers, gaining practical expertise through case studies and guided training (Fig. 8).

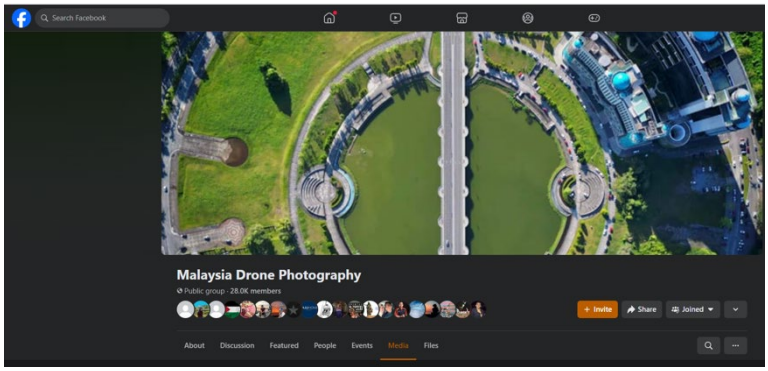

Figure 6: Malaysia Drone Photography Facebook

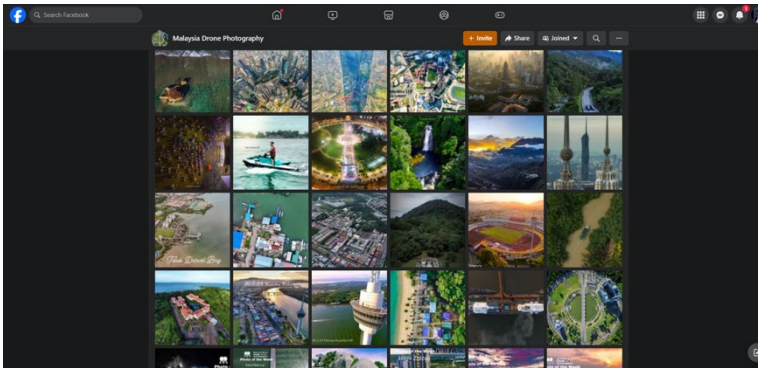

Figure 7: Aerial photos uploaded on Facebook by members of Malaysia Drone Photography

Figure 8: DJI Academy drone workshop (DJI Academy Malaysia - UTC, 2023)

The commercial drone services market in Malaysia, which includes aerial photography, is rapidly growing. According to Global Drone Market Report 2021–2026 by Drone Industry Insights, the worldwide drone market is expected to reach $41.3 billion by 2026 at a compound annual growth rate (CAGR) of 9.4% (Technode Global, 2022). Furthermore, drone industry income in Asia, including Malaysia, is predicted to treble to $17.9 billion by 2025 (Technode Global, 2022).

This expansion is seen in the growing number of organisations and independent photographers providing professional aerial photography services. These services are in high demand in many industries, including real estate, where aerial imagery provides full property views, and event photography, where drones record unique perspectives of weddings and other events. In the tourism industry, aerial photography plays an important role in promoting locations through visually appealing images.

Regulatory compliance is critical in Malaysia's professional aerial photography industry. According to the Global Drone Conference (2024), commercial drone operators must receive valid licensing from Malaysia's Civil Aviation Authority (CAAM). There are currently more than 1,000 licensed drone operators, many of whom specialise in aerial photography. CAAM-accredited certification programs at institutions such as Universiti Teknologi Malaysia (UTM) and private training centres ensure that operators receive sufficient training and follow safety rules. These laws include restrictions on flying in banned airspace, height limits, and necessary operational permits to ensure industry safety and compliance.

4.0 Analysis

As reported by The Edge (2024), Malaysia is making remarkable progress in drone technology. The country is acknowledged for its proactive stance in drone preparedness, as evidenced by its ranking of No. 21 by Drone Sector Insights in 2023. This ranking reflects the robust government backing for the drone sector in the country and has had a profound impact (Table 2) on the aerial photography industry in Malaysia in multiple ways:

Table 2: Drones Impact

Impact	Justification
Cost-effectiveness	Drones have substantially decreased the expense of aerial photography in comparison to conventional approaches such as helicopters. The increased affordability has created opportunities for corporations and people to obtain high-quality aerial imagery and footage (DroneCult, 2015).
Accessibility and Ease of Use	Drones possess a notable ease of operation and transportation, hence enhancing the accessibility of aerial photography to a broader spectrum of consumers, encompassing small businesses and freelancers (Drone Sifu Productions Sdn Bhd, 2020).
New Perspectives and Creativity	Drones have exceptional versatility in capturing distinctive angles and viewpoints, enabling photographers to produce breathtaking and pioneering aerial photographs that were previously unattainable or prohibitively costly (DroneCult, 2015).

Increased Efficiency and Speed	Drones possess the ability to swiftly traverse expansive regions and acquire data at a significantly accelerated pace compared to conventional techniques, thereby enhancing the effectiveness of diverse applications, including surveying, mapping, and inspection (Infinity Sky, 2020).
Safety Improvements	In certain applications like infrastructure inspection, drones can replace the need for humans to access dangerous locations, improving overall safety (Infinity Sky, 2020).

Nevertheless, the aerial photography sector in Malaysia is also affected by several challenges and considerations, as listed as follows (Table 3):

Table 3: Drone Challenges and Considerations

Challenges and Considerations	**Justification**
Regulatory Landscape	The dynamic restrictions pertaining to drone usage in Malaysia, as referenced in your article, can present difficulties for operators. It is essential to remain informed about license prerequisites and operational constraints (Norhusna Emirah Onn, 2022).
Data Processing and Management	Efficient processing, storage, and analysis solutions are necessary to handle the substantial volumes of data produced by drone photography.
Public Perception and Privacy Concerns	Ensuring the industry's long-term adoption requires addressing public concerns about privacy and responsible drone operation, as is the case with any new technology.

5.0 Conclusion

Drone technology has the potential to significantly help Malaysia's aerial photography sector, particularly in monitoring the link between rural and urban areas. When it comes to acquiring high-resolution photographs and geospatial data, drones are a more efficient and cost-effective alternative to traditional surveillance methods. This method has numerous uses, such as land use mapping, infrastructure assessment, and environmental monitoring.

To effectively reap these benefits, Malaysia must solve several major issues. Establishing a clear legislative framework is critical for balancing innovation with privacy and security concerns. Furthermore, standardising data gathering and processing procedures will improve the accuracy and utility of drone-captured data. Collaboration among researchers, industry stakeholders, and government agencies will be critical in expanding drone technology for aerial photography and assuring its safe and successful incorporation into many industries.

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