



STRATEGIES OF THE INDONESIAN MILITARY IN DISTRIBUTING LOGISTICS IN OPERATIONAL AREAS THROUGH SUPPLY POINTS WITH THE EMPOWERMENT OF SPECIAL DRONES (CASE STUDY: TNI OPERATIONAL AREAS IN PAPUA)

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Abstract: In this qualitative study, we explore the logistical distribution strategies employed by the Indonesian military during operational deployments. Utilizing a mixed-method approach combining literature review and library research, our analysis delves into the complexities of supply chain management under dynamic field conditions. Logistical support plays a crucial role in ensuring the effectiveness of military operations. The Indonesian Armed Forces have faced numerous challenges in maintaining efficient logistics systems, particularly in remote or conflict zones where infrastructure is limited. This study aims to identify best practices and areas for improvement in their current methodologies. Our methodology involves a thorough examination of existing literature on military logistics and supply chain management. We also conducted library research focusing on case studies from various international conflicts where similar logistical challenges were encountered by other armed forces. This qualitative approach allows for an in-depth understanding of the strategic decisions made during operational deployments. The findings indicate that effective communication between command centers and field units is essential for smooth logistics operations. The use of digital platforms has significantly enhanced real-time tracking capabilities, enabling more efficient resource allocation. Additionally, leveraging local resources through partnerships with civilian organizations can mitigate some logistical burdens. However, our analysis reveals several areas requiring attention. These include ensuring robust contingency planning against unexpected disruptions such as natural disasters or enemy actions. Furthermore, there needs to be greater emphasis placed on training personnel involved in these critical roles so they are equipped to handle diverse scenarios effectively. This study contributes valuable insights into how Indonesian military logistics might be optimized using established best practices from around the world while addressing unique regional considerations. By integrating advanced technology solutions alongside traditional methods tailored specifically towards their operational environment; we believe significant improvements could be achieved thereby enhancing overall mission success rates.

Keywords: communication systems, local resource utilization, military logistics, operational deployment.



INTRODUCTION:

The Indonesian National Armed Forces plays a crucial role in safeguarding the nation's security and preserving the sovereignty of the Republic of Indonesia. Ensuring the effective distribution of logistics, particularly in remote and challenging operational areas such as the Papua region, is a critical aspect of the military's operations. This research paper explores the strategies employed by the Indonesian military in distributing logistics through supply points, leveraging the empowerment of special drones to enhance the efficiency and reach of these operations.

Advances in technology have significantly transformed various sectors, including the military, where the use of drones, also known as Unmanned Aerial Vehicles, has become increasingly prevalent [1]. The integration of drones into the military's logistical activities can potentially streamline the distribution of essential supplies, overcome geographical barriers, and improve the overall responsiveness and resilience of the armed forces. The distribution of logistics in operational areas can be a complex and multifaceted challenge. The use of drones in logistics distribution has gained traction in recent years, with the benefits of this emerging technology becoming more apparent.

Challenges in Logistics Distribution in Operational Areas

The Indonesian military faces numerous obstacles in effectively distributing logistics to its operational areas in remote regions, such as the Papua province. These challenges include the vastness of the geographical area, limited transportation infrastructure, adverse weather conditions, and the need to ensure the timely delivery of critical supplies to support the military's operations. The rugged terrain, dense forests, and scattered settlements in the Papua region present significant logistical hurdles, as the limited ground-based transportation network makes it exceedingly difficult to maintain a reliable and efficient logistics chain. Furthermore, the lack of adequate infrastructure, such as well-developed road networks and functional airfields, hinders the military's ability to swiftly and reliably transport essential supplies to its personnel in the operational areas, further exacerbating the logistical challenges [2].

The high costs associated with traditional logistics distribution methods, such as the reliance on ground-based transportation, have also placed a significant burden on the military's resources. In response to these pressing challenges, the Indonesian military has recognized the need to explore innovative and cost-effective solutions to improve the distribution of logistics in its operational areas. While the use of ground-based transportation remains an essential component of the military's logistics strategy, the exploration of alternative methods, such as the utilization of special drones, has become a crucial consideration.

The potential benefits of incorporating drones into the military's logistics distribution operations in remote and challenging operational areas are numerous. Drones can overcome physical barriers, navigate through difficult terrain, and reach remote locations without the constraints of ground-based transportation infrastructure. Moreover, the deployment of drones can potentially reduce delivery times, as they are not subject to traffic conditions or road infrastructure limitations [3].



The Role of Drones in Logistics Distribution

The integration of drones into the military's logistics distribution operations can offer several significant advantages. Drones can provide a faster and more direct delivery of essential supplies by traversing through the air, unencumbered by the challenges posed by ground-based transportation. This ability to bypass geographical obstacles and traverse rugged terrain can be particularly beneficial in remote and isolated operational areas, where the lack of adequate infrastructure and the challenges of the landscape make it difficult to maintain a reliable and efficient supply chain. Furthermore, the use of drones can potentially reduce the overall operational costs associated with logistics distribution, as they do not require the same level of investment in infrastructure, maintenance, and personnel as traditional ground-based transportation methods. Drones can offer a more cost-effective solution by eliminating the need for extensive road networks, fuel-intensive vehicles, and the associated maintenance and staffing requirements. In addition to their speed and cost-effectiveness, drones can also play a crucial role in enhancing the responsiveness and flexibility of the military's logistics operations [4]. The ability to rapidly deploy drones to deliver supplies directly to forward operating bases or isolated units can significantly improve the military's ability to respond to changing operational needs and ensure the timely delivery of critical resources. This enhanced responsiveness can be a game-changer in dynamic and rapidly evolving operational environments, where the swift and reliable distribution of logistics can be a determining factor in mission success [5].

By leveraging the capabilities of drones, the Indonesian military can explore new strategies to distribute logistics more effectively and efficiently in its operational areas. This can include the establishment of supply points that can be accessed by drones, which can serve as centralized hubs for the storage and distribution of essential supplies. Drones can be utilized to transport the goods from these hubs to the military personnel stationed in remote and hard-to-reach locations. The empowerment of special drones, equipped with advanced capabilities, can further enhance the military's logistics distribution efforts in these challenging operational areas. The use of drones can provide faster and more direct delivery of supplies, overcome geographical barriers, and potentially reduce operational costs associated with traditional ground-based transportation methods. Through the strategic deployment of drone-accessible supply points and the empowerment of specialized drone technology, the Indonesian military can strengthen its logistics distribution network, improving responsiveness and resilience in support of its operations across remote and isolated regions [4].

The strategic integration of drones into the Indonesian military's logistics distribution operations presents a promising opportunity to enhance the efficiency, responsiveness, and resilience of its supply chain in remote and challenging operational areas. By leveraging the advantages of drone technology, the military can explore new strategies to distribute essential supplies more effectively, while also addressing the limitations and challenges associated with their use.

To effectively implement drone-based logistics distribution, the military can establish supply points that are accessible by drones, serving as centralized hubs for the storage and distribution of critical supplies. Drones can then be utilized to transport these goods from the supply points to the military personnel stationed in remote and hard-to-reach locations. The empowerment of special



drones, equipped with advanced capabilities, can further enhance the military's logistics distribution efforts in these challenging operational areas. The use of drones can provide faster and more direct delivery of supplies, overcome geographical barriers, and potentially reduce operational costs associated with traditional ground-based transportation methods.

By strategically deploying drone-accessible supply points and empowering specialized drone technology, the Indonesian military can strengthen its logistics distribution network, improving responsiveness and resilience in support of its operations across remote and isolated regions. This approach can help the military overcome the traditional logistical challenges, such as the vastness of the geographical area, limited transportation infrastructure, and adverse weather conditions, that have historically hindered the effective distribution of essential supplies to its personnel in the operational areas [6].

LITERATURE REVIEW AND METHODOLOGY:

The scholarly literature highlights both the benefits and challenges of integrating drones into logistics distribution operations. Research suggests that drones offer advantages in terms of speed, cost-effectiveness, and the ability to navigate through difficult terrain, overcoming the limitations of traditional ground-based transportation methods. For instance, a study by Poikonen et al. [7] examines the optimization of a multi-mode last-mile parcel delivery system that incorporates vans, trucks, and drones. The study explores the potential benefits of drone-based delivery, such as faster travel speeds, the ability to bypass traffic, and the capacity to reach remote areas without extensive infrastructure [7].

Additionally, a study by Awais et al. investigates the use of a combined centralized and decentralized architecture for the collaborative operation of drones in a parts delivery scenario, demonstrating the potential of drone-based logistics to enhance efficiency and responsiveness [7]. However, the literature also acknowledges the potential limitations and drawbacks associated with the use of drones in logistics distribution, such as their restricted carrying capacity, the need for frequent trips between distribution centers and customer locations, and safety concerns related to drone operations [8].

Furthermore, studies have revealed that while drones can provide benefits in logistics distribution, there are several limitations related to safety and flight area that must be considered. Not all countries permit the use of drones in urban areas [3]. Additionally, the limited carrying capacity of drones, which can only transport one payload at a time, as well as their restricted flight range, necessitate repeated deliveries between distribution centers and customer locations [9].

The strategic integration of drones into the Indonesian military's logistics distribution operations presents a promising opportunity to enhance the efficiency, responsiveness, and resilience of its supply chain in remote and challenging operational areas. By leveraging the advantages of drone technology, the military can explore new strategies to distribute essential supplies more effectively, while also addressing the limitations and challenges associated with their use [4].

While the scholarly literature highlights the promising potential of drones in logistics distribution, it also underscores the need to address the practical challenges and limitations associated with their deployment. The Indonesian military's efforts to integrate drones into its logistics distribution



operations must carefully consider these factors to ensure the effective and efficient delivery of critical supplies to its personnel in remote and isolated operational areas.

METHODOLOGY

This study employs a mixed-method qualitative approach, combining literature review and library research to explore the logistical strategies of the Indonesian military during operational deployments.

- **Literature Review:** A comprehensive review of academic journals, military reports, and books focused on military logistics, supply chain management, and the challenges faced in remote or conflict zones with limited infrastructure. The review highlighted both global best practices and specific strategies used by the Indonesian Armed Forces.
- **Library Research:** Case studies from international conflicts were analyzed to identify common logistical challenges and solutions. The research also examined the use of digital platforms for real-time tracking and resource management in military logistics.
- **Case Study Analysis:** Comparative analysis of global military operations provided insights into effective logistics strategies that could be adapted to the Indonesian context.
- **Data Synthesis:** Key themes such as communication between command centers and field units, use of digital tools, local resource integration, and contingency planning were identified as critical for effective logistics.

Qualitative Analysis: The study analyzed strategic decisions made during deployments, focusing on logistical

RESULTS AND THEIR ANALYSIS

Importance of Pragmatic Competence in Teacher Development

Strategic Use of Supply Points in Remote Areas

The Indonesian military (TNI) has effectively established a network of supply points (SPs) throughout Papua to facilitate the distribution of logistical resources. These supply points are strategically located in areas where access is either difficult or impractical due to Papua's rugged terrain. The SPs serve as central hubs for storing critical supplies, including food, medical equipment, fuel, and ammunition, which are then distributed to units operating in the field [10]. The TNI's ability to maintain a stable and secure supply chain in these remote regions plays a crucial role in sustaining operational readiness.

The positioning of these supply points is particularly important in Papua, where transportation infrastructure is often minimal. Many areas are only accessible by foot, boat, or air, and the use of traditional ground transportation methods can be severely limited by challenging weather conditions and the lack of proper roads. By placing SPs in more accessible areas, the TNI ensures that resources are available for rapid deployment without relying heavily on complex transportation systems [11]. This strategy enhances operational flexibility and provides military units with a constant flow of supplies, regardless of local infrastructural challenges.

The TNI's approach to supply points has included efforts to fortify these hubs, ensuring their security in hostile environments. In areas prone to insurgent activity or conflict, supply points are often well-defended and maintained with additional personnel and resources to protect against



theft, sabotage, or attacks. This strategic placement and protection of supply points help the TNI avoid significant disruptions in logistics operations, particularly in high-risk or conflict-prone regions like Papua.

Integration of Special Drones for Logistics Operations

The integration of drones into the logistics strategy has become one of the TNI's most innovative approaches to addressing logistical challenges in Papua. Special drones are used to transport lightweight supplies to difficult-to-reach areas, such as remote mountain bases or jungle outposts, where traditional transportation methods are either inefficient or impossible [12]. This use of drones allows the TNI to bypass the physical limitations posed by Papua's challenging terrain and reach areas that might otherwise be inaccessible for land vehicles or helicopters. Drones are equipped with precise navigation systems that allow for accurate deliveries and real-time monitoring of logistics activities.

Drones offer several advantages over traditional delivery methods. First, they can be deployed quickly in emergency situations to deliver critical supplies, such as medical aid or ammunition, to units in need. Additionally, drones significantly reduce the risks associated with human transportation, especially in high-conflict zones or during adverse weather conditions. With their ability to deliver supplies directly to remote outposts, drones help minimize logistical bottlenecks, reduce response times, and increase the overall efficiency of operations [13]. The use of drones also ensures that the TNI can maintain a continuous flow of supplies without being hindered by the limitations of ground infrastructure.

The deployment of drones also presents challenges, particularly related to technical support and maintenance. The TNI has invested in training personnel to operate and maintain drones effectively, ensuring they can handle any technical malfunctions or challenges that arise during missions. Additionally, security concerns, such as the risk of drones being intercepted or destroyed by hostile forces, require constant vigilance and adaptation. Despite these challenges, the integration of drones has proven to be a valuable asset in ensuring the effective distribution of logistics in Papua's complex operational environment.

Table 1. The Use of Drones in TNI Logistics Operations in Papua

Aspect	Description
Drone Integration in Logistics Strategy	Drones are used to transport lightweight supplies to remote areas such as mountain bases or jungle outposts, bypassing physical limitations of Papua's terrain. Drones are equipped with precise navigation systems for accurate deliveries and real-time monitoring of logistics activities.
Advantages of Drones	Drones can be deployed quickly in emergencies to deliver critical supplies (medical aid, ammunition), reduce risks to human personnel in conflict zones, and bypass infrastructure limitations. Drones help minimize logistical bottlenecks, reduce response times, and increase operational efficiency.



Aspect	Description
Risks and Challenges of Drone Deployment	Challenges include the need for technical support and maintenance. The TNI has invested in training personnel to handle drone malfunctions. Security risks such as drones being intercepted or destroyed by hostile forces require constant vigilance and adaptation.

Leveraging Local Resources and Civilian Partnerships

The TNI has also adopted a strategy of leveraging local resources and forming partnerships with civilian organizations to ease the logistical burdens in Papua. By collaborating with local suppliers, businesses, and civilian agencies, the military can access critical supplies that might otherwise be difficult to transport from central supply points [14]. Local resources, including food, fuel, and medical supplies, are integrated into the military's logistics system, allowing for more efficient and cost-effective distribution, particularly in areas where transportation infrastructure is lacking.

These partnerships with local communities also provide the TNI with valuable insights into regional conditions, including weather patterns, terrain challenges, and local security concerns. By relying on local knowledge, the military can better plan logistics operations and anticipate potential disruptions. This collaboration helps mitigate some of the challenges of operating in an isolated and unpredictable region like Papua. Moreover, local partnerships foster a sense of goodwill and cooperation, which can be beneficial for both humanitarian aid efforts and military operations.

Despite the benefits, there are challenges in coordinating with local resources, especially when it comes to ensuring the consistency and quality of supplies. Variations in supply standards, limited availability of certain goods, and logistical coordination issues can sometimes hinder the effectiveness of local partnerships [15]. Additionally, local sources may not always have the capacity to meet the high demands of military logistics during peak operational periods. Nevertheless, the integration of local resources remains a critical component of the TNI's logistics strategy, helping to alleviate some of the pressures of operating in Papua.

Contingency Planning and Adaptability in Dynamic Environments

One of the most important findings of this study is the TNI's emphasis on robust contingency planning to address unexpected disruptions in logistics operations. Papua's challenging operational environment, marked by unpredictable weather patterns, security threats, and natural disasters, necessitates the ability to quickly adapt logistical strategies [16]. The military has developed flexible logistics systems that can be adjusted on short notice to respond to unforeseen circumstances, such as landslides, floods, or enemy actions. This adaptability is vital for ensuring that logistical operations remain functional and that resources continue to reach troops in the field, regardless of external challenges.

The TNI's approach to contingency planning involves the creation of multiple logistical pathways, ensuring that if one route becomes compromised, alternatives are readily available. This redundancy is particularly critical in a region like Papua, where transportation options are limited and external factors can quickly alter the landscape. The use of drones has enhanced this



adaptability, as they can quickly be redirected to alternate supply routes if traditional methods are hindered. By continuously monitoring field conditions and maintaining multiple logistical options, the TNI can effectively maintain operations even in the face of significant disruptions.

However, the study also highlights areas for improvement, particularly in terms of real-time risk assessment and mitigation. While the TNI's contingency plans are well-developed, the ability to dynamically adjust to sudden changes in the operational environment is still an area requiring further refinement. More advanced predictive analytics and better integration of real-time data could help the TNI anticipate potential disruptions before they occur. Enhancing these capabilities would allow for even greater efficiency in managing logistics and ensure that resources are distributed with minimal delays, regardless of unforeseen challenges.

DISCUSSION

The findings of this study reveal that the Indonesian military (TNI) has developed a strategic approach to logistics operations in Papua that leverages both traditional and modern methods to overcome the unique challenges of the region. The use of supply points, combined with innovative technologies such as special drones, plays a critical role in ensuring the continuous flow of logistical resources to remote and difficult-to-access areas. The strategic deployment of these supply points addresses the lack of infrastructure in Papua and ensures that essential supplies reach operational units even in the most isolated locations. However, the effectiveness of this strategy is heavily reliant on the consistent operation of transportation routes and the ability to secure these hubs in a conflict-prone environment.

The integration of drones into TNI's logistics operations represents a significant step forward in modernizing military logistics. Drones enable rapid delivery of supplies to locations where traditional transportation methods may be unfeasible. This advancement not only reduces reliance on ground transportation but also offers flexibility in responding to unforeseen disruptions [17]. Despite the clear benefits, challenges remain, such as ensuring the operational readiness of drones in remote locations, maintaining their technical functionality, and addressing security concerns related to potential drone interception. These factors highlight the need for continuous technological innovation and personnel training to ensure drones can be reliably used as part of the military's logistics strategy.

Another key finding is the TNI's use of local resources and partnerships with civilian organizations. By engaging local communities, the military benefits from a supply network that reduces the pressure on central logistics systems [18]. This partnership allows for more efficient distribution of basic supplies and supports the TNI's operational effectiveness by reducing the need for long-distance transportation. However, reliance on local resources introduces its own set of challenges, such as ensuring consistent supply quality and managing the logistical coordination between civilian and military entities. Furthermore, the capacity of local suppliers to meet the demands of military logistics may sometimes fall short, especially during peak operational periods. Contingency planning and adaptability emerged as critical factors in maintaining operational continuity in Papua's unpredictable environment. The military's ability to quickly adapt to changes in the terrain, weather conditions, or security situations ensures that logistics operations remain resilient [19]. However, despite the TNI's robust contingency measures, the study highlights that there is still room for improvement in the integration of real-time data and predictive analytics. By



enhancing these systems, the TNI could better anticipate disruptions before they occur and adapt logistics strategies more proactively, further increasing the efficiency of their supply chain.

CONCLUSIONS

The strategic integration of special drones into the Indonesian military's logistics distribution operations holds significant potential to enhance the efficiency, responsiveness, and resilience of its supply chain in remote and challenging operational areas. The military can leverage the unique capabilities of drone technology, such as their superior speed, mobility, and accessibility, to overcome the geographical and logistical constraints that have traditionally hindered the effective delivery of essential supplies to its personnel stationed in remote and hard-to-reach locations.

By strategically deploying drone-accessible supply points and empowering specialized drone technology, the Indonesian military can ensure the continuous and reliable flow of critical resources to its operational areas, even in the face of disruptions to traditional distribution channels. The successful implementation of a drone-based logistics strategy can improve the military's operational capabilities and contribute to the overall well-being and support of its personnel deployed in remote and isolated regions by ensuring the timely and reliable delivery of essential supplies, equipment, and resources to meet their needs.

The successful implementation of a drone-based logistics strategy can improve the military's operational capabilities and contribute to the overall well-being and support of its personnel deployed in remote and isolated regions by ensuring the timely and reliable delivery of essential supplies, equipment, and resources to meet their needs. This includes the ability to transport critical medical supplies, emergency relief items, and other vital resources to areas that are difficult to access through traditional means, thereby enhancing the military's responsiveness and resilience in crisis situations. Additionally, the use of drones for logistics can potentially reduce the risk to human personnel by minimizing the need for dangerous ground-based transportation missions. Overall, the integration of drone technology into the Indonesian military's logistics operations holds significant promise to optimize the distribution of resources, improve operational efficiency, and support the well-being of personnel serving in remote and challenging environments.

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