Geodefense Capabilities as A Mediating Mechanism Between Policy Integration and Defense Logistics Readiness in Jakarta

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ABSTRACT:

Background. Urban defense systems increasingly depend on the capacity of metropolitan infrastructure, governance, and operational networks to sustain logistics functions under complex disruption. This study examines geodefense capabilities as a mediating mechanism between policy integration and defense logistics readiness in Jakarta.

Methods. A quantitative explanatory design was applied using survey data collected from relevant stakeholders in defense, infrastructure, public governance, logistics, and crisis-related sectors. The data were analysed using partial least squares structural equation modelling with SmartPLS.

Results. The findings show that policy integration and governance significantly enhance geodefense capabilities, while geodefense capabilities exert the strongest direct effect on defense logistics readiness. In contrast, non-military threats do not significantly influence either geodefense capabilities or defense logistics readiness, indicating that threat awareness alone is insufficient to generate preparedness. Policy integration also has no significant direct effect on defense logistics readiness; however, its indirect effect through geodefense capabilities is significant, confirming full mediation. The model explains 59.9% of the variance in defense logistics readiness, demonstrating substantial explanatory power. The Importance–Performance Map Analysis further identifies geodefense capabilities as the most strategic improvement priority because they have the highest importance but relatively lower performance.

Conclusions. These results suggest that Jakarta's defense logistics readiness cannot be strengthened merely through threat recognition or administrative coordination. Instead, policy integration must be translated into operational geodefense capabilities, including spatial vulnerability mapping, protection of critical corridors, continuity planning, integrated data systems, early warning mechanisms, and civil–military operational preparedness. This study contributes to defense logistics and urban resilience literature by providing empirical evidence that geodefense capabilities function as the core transmission mechanism linking governance integration with metropolitan logistics readiness.

Keywords Urban Resilience, Non-Military Threats, Critical Infrastructure, Civil-Military Coordination, Supply Chain Continuity, PLS-SEM.

Introduction

Defense logistics readiness has become an increasingly important issue for metropolitan regions that depend on complex infrastructure networks, intersectoral coordination, and rapid crisis response. In a dense urban system such as Jakarta, logistics readiness is not only related to the availability of physical infrastructure, but also to the capacity of institutions to maintain continuity, coordinate resources, and restore critical functions under disruptive conditions. Disruptions to defense logistics may emerge from non-military threats, including cyber incidents, ecological hazards, social instability, disinformation, and supply chain disturbances. These threats are difficult to manage because they do not operate through a single sector or a single institutional channel; rather, they interact across infrastructure, governance, technology, and operational systems. Therefore, logistics readiness requires an integrated capability architecture that can support preparedness, continuity, adaptation, and recovery.

Previous studies on resilience and supply chain continuity have emphasized that preparedness is strongly determined by the ability of systems to anticipate disruptions, absorb shocks, and recover operational functions after adverse events (Ponomarov & Holcomb, 2009; Sheffi & Rice, 2005). Supply chain resilience is also shaped by collaboration, flexibility, visibility, and adaptive capacity across organizational boundaries (Scholten & Schilder, 2015). In the public-sector and infrastructure context, resilience is not merely a technical property, but also an institutional and governance outcome, because emergency response and continuity depend on the coordination of multiple actors, mandates, and resources (Boin & van Eeten, 2013; Linkov et al., 2018). This perspective is particularly relevant for defense logistics, where operational readiness depends on the interaction between spatial planning, infrastructure protection, technology integration, crisis procedures, and civil–military coordination.

The concept of geodefense capabilities offers a useful framework for understanding how spatial, physical, systemic, governance, technological, and human-operational layers can be integrated into a defense-oriented logistics system. In this study, geodefense capabilities refer to the capacity of an urban defense logistics system to map vulnerabilities, protect critical corridors and facilities, mitigate cascading failures, coordinate crisis governance, integrate information systems, and strengthen operational response. This construct is consistent with the broader resilience literature, which views resilience as an emergent property of interconnected capabilities rather than a single organizational attribute (Hollnagel, 2014; Linkov et al., 2018). It also aligns with the dynamic capability perspective, which argues that organizational performance under uncertainty depends on the ability to integrate, build, and reconfigure internal and external competencies in response to changing environments (Eisenhardt & Martin, 2000; Teece, 2018).

Although non-military threats are increasingly recognized as important sources of disruption, threat perception alone may not automatically improve preparedness. Risk governance literature suggests that awareness of risk must be translated into institutional processes, decision mechanisms, and operational capabilities before it can produce meaningful resilience outcomes (Renn, 2017). In the absence of such mechanisms, perceived threats may remain detached from actual capability development. This creates an important theoretical and practical question: whether non-military threats directly shape geodefense capabilities and defense logistics readiness, or whether readiness depends more on internal capability-building and policy integration.

Policy integration and governance coordination are also central to defense logistics readiness. Collaborative governance theory explains that complex public problems require coordination among government agencies, private actors, infrastructure operators, and other stakeholders involved in policy implementation (Ansell & Gash, 2008; Emerson et al., 2012). In defense logistics, integration is needed to align spatial policy, infrastructure development, crisis management, logistics mobilization, and operational command structures. However, policy integration may not directly produce logistics readiness unless it is converted into concrete operational capabilities. This indicates the possible mediating role of geodefense capabilities in linking governance arrangements with defense logistics outcomes.

Despite the growing literature on resilience, supply chain disruption, and collaborative governance, limited empirical attention has been given to the mediating mechanism through which policy integration and threat perception influence defense logistics readiness in an urban geodefense context. Existing studies tend to examine resilience from organizational, supply chain, or infrastructure perspectives, but fewer studies integrate these dimensions into a model that explains logistics readiness through geodefense capabilities. This gap is important because defense logistics readiness in metropolitan areas cannot be sufficiently explained by external threats or governance design alone. It requires an empirical assessment of how policy integration, non-military threats, and geodefense capabilities interact within a single structural model.

To address this gap, this study examines geodefense capabilities as a mediating mechanism between policy integration and defense logistics readiness in Jakarta. Specifically, this study aims to analyze the effects of non-military threats and policy integration on geodefense capabilities and defense logistics readiness, as well as to determine whether geodefense capabilities mediate the relationship between policy integration and readiness. By doing so, this study contributes to the literature on defense logistics, resilience, and collaborative governance by proposing and testing an integrated capability-based model in an urban defense context.

Based on the theoretical arguments above, the following hypotheses are proposed:

H1. Non-military threats have a significant effect on geodefense capabilities.

H2. Non-military threats have a significant effect on defense logistics readiness.

H3. Policy integration and governance have a significant effect on geodefense capabilities.

H4. Policy integration and governance have a significant effect on defense logistics readiness.

H5. Geodefense capabilities have a significant effect on defense logistics readiness.

Methods

This study employed a quantitative explanatory research design to examine the relationships among non-military threats, policy integration and governance, geodefense capabilities, and defense logistics readiness in Jakarta. The research model was developed to test both direct and indirect relationships among the constructs, with geodefense capabilities positioned as a mediating variable between policy integration and defense logistics readiness. A survey-based approach was used because the study aimed to capture expert and stakeholder perceptions regarding the readiness of Jakarta's defense logistics system in facing multidimensional disruptions.

2.1. Sampling and data collection

Data were collected using a structured questionnaire distributed to respondents with knowledge or professional involvement in defense, spatial planning, infrastructure, cybersecurity, public policy, logistics, and crisis-related governance. The target respondents included representatives from ministries or government agencies, the military or police, local government, state-owned or regional-owned infrastructure enterprises, private infrastructure operators, academics, and researchers. The selection of respondents was based on their relevance to the study context and their ability to assess policy integration, geodefense capabilities, and logistics readiness in Jakarta.

The questionnaire was administered during [insert data collection period]. A total of [insert number] valid responses were obtained and used for further analysis. Participation was voluntary, and the respondents were informed that the data would be used only for academic purposes. The questionnaire did not require respondents to provide personally identifying information, and confidentiality was maintained throughout the data collection process.

2.2. Research instrument

The research instrument was developed using a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. The questionnaire consisted of four main constructs: non-military threats, policy integration and governance, geodefense capabilities, and defense logistics readiness. The initial instrument comprised 27 reflective indicators, consisting of five indicators for non-military threats, five indicators for policy integration and governance, 12 indicators for geodefense capabilities, and five indicators for defense logistics readiness.

Non-military threats were measured through indicators related to cyber threats, ecological threats, social instability or disinformation, external supply chain disruption, and coordination fragmentation. Policy integration and governance were measured through indicators related to central–local synchronization, cross-sector operational coordination, defense-oriented spatial policy, readiness-based development evaluation, and the integration of infrastructure operators in crisis systems. Geodefense capabilities were measured through six capability layers: spatial, physical, systemic, governance, technology and information, and human-operational dimensions. Defense logistics readiness was measured through indicators related to logistics continuity, recovery speed, strategic logistics mobilization, support from critical infrastructure, and readiness to face hybrid crises.

2.3. Measurement model specification

All constructs in this study were specified as reflective constructs. This specification was selected because the indicators were treated as manifestations of their respective latent variables and were expected to be correlated with one another. The measurement model was evaluated by examining indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Indicator reliability was assessed using outer loadings, with values of 0.70 or higher considered acceptable. Internal consistency reliability was evaluated using Cronbach's alpha, rho_A, and composite reliability. Convergent validity was assessed using the average variance extracted, with values above 0.50 indicating that the construct explained more than half of the variance of its indicators. Discriminant validity was evaluated using the Fornell–Larcker criterion to ensure that each construct was empirically distinct from the other constructs in the model (Fornell & Larcker, 1981; Hair et al., 2022).

2.4. Data analysis

The data were analysed using partial least squares structural equation modelling (PLS-SEM) with SmartPLS. PLS-SEM was selected because it is appropriate for prediction-oriented research models, complex relationships among latent variables, and studies that seek to evaluate both measurement and structural models simultaneously (Hair et al., 2022). The analysis followed a two-stage procedure consisting of the assessment of the measurement model and the structural model.

In the first stage, the measurement model was assessed by examining outer loadings, Cronbach's alpha, rho_A, composite reliability, average variance extracted, and the Fornell–Larcker criterion. Indicators that did not meet acceptable measurement criteria were evaluated for removal when their exclusion improved the reliability and validity of the model. In the second stage, the structural model was evaluated by examining path coefficients, t-values, p-values, coefficient of determination, predictive relevance, and collinearity. The coefficient of determination was used to assess the explanatory power of the endogenous constructs, while predictive relevance was evaluated using the Q^2 value. Collinearity was assessed using the variance inflation factor to ensure that the structural estimates were not affected by multicollinearity problems.

Hypothesis testing was conducted using a bootstrapping procedure with 10,000 resamples. The significance of direct effects was determined using t-values and p-values at the 0.05 significance level. Mediation effects were examined through indirect and total effects to determine whether geodefense capabilities transmitted the effect of policy integration and governance on defense logistics readiness (Nitzl et al., 2016). In addition, an Importance–Performance Map Analysis was conducted to identify priority areas for improvement by comparing the importance and performance of each antecedent construct in predicting defense logistics readiness (Ringle & Sarstedt, 2016).

2.5. Ethical considerations

The study involved questionnaire-based data collection from adult respondents with relevant professional or academic experience. Participation was voluntary, and respondents were informed that their responses would be used for academic research purposes. The questionnaire did not collect sensitive personal data, and the confidentiality of respondents was maintained. The complete ethical statement is provided in the Ethical considerations section of the Declarations.

Results

The results are presented according to the PLS-SEM evaluation procedure used in this study. The analysis begins with the assessment of the measurement model to confirm indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. After the adequacy of the measurement model was established, the structural model was evaluated to examine the explanatory power, predictive relevance, model fit, and hypothesised relationships among the constructs. The results further include the analysis of indirect and total effects to assess the mediating role of geodefense capabilities, followed by an Importance–Performance Map Analysis to identify the most strategic constructs for improving defense logistics readiness in Jakarta.

3.1. Measurement model

The measurement model was evaluated before testing the structural relationships among the constructs. The retained model consisted of four reflective constructs: non-military threats, policy integration and governance, geodefense capabilities, and defense logistics readiness. As shown in Table 1, all retained indicators had outer loading values ranging from 0.701 to 0.911. These values satisfy the recommended threshold of 0.70, indicating that the indicators adequately represent their respective latent constructs (Hair et al., 2022).

Internal consistency reliability was also confirmed. Cronbach's alpha values ranged from 0.820 to 0.944, rho_A values ranged from 0.841 to 0.947, and composite reliability values ranged from 0.867 to 0.952. These results indicate that all constructs have satisfactory reliability. Convergent validity was established because the average variance extracted values ranged from 0.622 to 0.765, exceeding the minimum criterion of 0.50. Therefore, the retained indicators explain a sufficient proportion of variance in their corresponding constructs.

3.2. Discriminant validity

Discriminant validity was examined using the Fornell–Larcker criterion. As presented in Table 2, the square root of the average variance extracted was generally higher than the correlations among constructs, indicating acceptable empirical distinction among the latent variables (Fornell & Larcker, 1981). The relationship between geodefense capabilities and defense logistics readiness was very strong, with a correlation of 0.819, which is almost identical to the square root of the AVE for geodefense capabilities. This result is theoretically reasonable because geodefense capabilities are positioned as the closest predictor of defense logistics readiness in the model. However, because the value is very close, additional discriminant validity evidence such as HTMT may be reported if available.

3.3. Explanatory power and predictive relevance

The structural model was assessed after the measurement model met the required reliability and validity criteria. The coefficient of determination shows that policy integration and non-military threats explain 29.6% of the variance in geodefense capabilities. Meanwhile, non-military threats, policy integration and governance, and geodefense capabilities explain 59.9% of the variance in defense logistics readiness. These results indicate that the model has stronger explanatory power for defense logistics readiness than for geodefense capabilities.

Predictive relevance was also confirmed because the Q^2 values for both endogenous constructs were above zero. The Q^2 value for geodefense capabilities was 0.192, while the Q^2 value for defense logistics readiness was 0.451. These results indicate that the model has adequate predictive relevance (Hair et al., 2022).

3.4. Model fit

The model fit assessment indicates that the proposed model has an acceptable fit. As shown in Table 4, the SRMR value for both the saturated and estimated models was 0.071, which is below the recommended threshold of 0.08. This indicates that the difference between the observed and model-implied correlation matrices is within an acceptable range. The d_ULS and d_G values also remained within the corresponding bootstrap confidence intervals, supporting the adequacy of the overall model fit.

3.5. Structural model and hypothesis testing

The hypothesis testing results are presented in Table 5. The findings show that policy integration and governance had a positive and significant effect on geodefense capabilities ($\beta = 0.548$, $t = 7.478$, $p < 0.001$), supporting H3. Geodefense capabilities also had a positive and significant effect on defense logistics readiness (β = 0.729, t = 9.758, p < 0.001), supporting H5. This indicates that geodefense capabilities are the strongest direct predictor of defense logistics readiness in the model.

In contrast, non-military threats did not significantly affect geodefense capabilities (β = -0.097, t = 0.754, p > 0.05), so H1 was not supported. Non-military threats also did not significantly affect defense logistics readiness (β = -0.075, t = 1.152, p > 0.05), so H2 was not supported. Furthermore, policy integration and governance did not have a significant direct effect on defense logistics readiness (β = 0.070, t = 0.872, p > 0.05), so H4 was not supported. All VIF values were below the critical threshold, indicating that multicollinearity was not a problem in the structural model. All VIF values were below the critical threshold, indicating that multicollinearity was not a problem in the structural model. The final structural model is presented in Figure 1.

3.6. Mediation effects

The mediation analysis was conducted to determine whether geodefense capabilities transmit the effects of non-military threats and policy integration and governance on defense logistics readiness. As shown in Table 6, the indirect effect of non-military threats on defense logistics readiness through geodefense capabilities was not significant (β = -0.071, t = 0.753, p > 0.05). Its total effect was also not significant (β = -0.145, p > 0.05). Therefore, geodefense capabilities did not mediate the relationship between non-military threats and defense logistics readiness.

Different results were found for policy integration and governance. The indirect effect of policy integration and governance on defense logistics readiness through geodefense capabilities was positive and significant (β = 0.400, t = 6.205, p < 0.001). Its total effect was also significant (β = 0.470, p < 0.001). Because the direct effect of policy integration and governance on defense logistics readiness was not significant, while the indirect effect was significant, the results indicate full mediation. This means that policy integration contributes to defense logistics readiness only when it is translated into geodefense capabilities. This interpretation is consistent with mediation logic in PLS-SEM, where indirect effects are central for identifying transmission mechanisms between constructs (Nitzl et al., 2016).

3.7. Importance–Performance Map Analysis

The Importance–Performance Map Analysis was conducted to identify constructs that should be prioritized for improvement. IPMA combines the importance of each construct, represented by its total effect, with its performance score (Ringle & Sarstedt, 2016). As shown in Table 7, geodefense capabilities had the highest importance value (0.729), but its performance score was relatively low (53.479). This indicates that geodefense capabilities represent the most strategic area for improvement because increasing this construct is expected to generate the largest improvement in defense logistics readiness.

Policy integration and governance had moderate importance (0.470) and a higher performance score (61.457). This suggests that governance integration already performs better than geodefense capabilities, but its contribution to readiness depends on its ability to strengthen operational geodefense capabilities. Non-military threats had the highest performance score (85.874), but its importance value was negative and not significant (-0.145). This indicates that threat awareness is already high, but it does not directly or indirectly improve defense logistics readiness in the current model.

Overall, the results demonstrate that defense logistics readiness in Jakarta is primarily explained by geodefense capabilities. Policy integration and governance are important, but their effect operates indirectly through geodefense capabilities. Non-military threats, although perceived as highly present, do not significantly influence either geodefense capabilities or defense logistics readiness. Therefore, the empirical model supports a capability-based explanation of defense logistics readiness, where integrated geodefense capabilities serve as the main mechanism linking governance integration with system readiness.

Discussion

The results of this study demonstrate that defense logistics readiness in Jakarta is primarily a capability-based outcome. The strongest empirical relationship in the model is the effect of geodefense capabilities on defense logistics readiness, while policy integration and governance affect readiness indirectly through geodefense capabilities. This finding indicates that the readiness of an urban defense logistics system cannot be explained only by the existence of policy coordination or by the perception of external threats. Readiness depends on whether governance arrangements are translated into spatial, physical, systemic, technological, and operational capacities that can sustain logistics functions during disruption. This interpretation is consistent with the resilience literature, which views resilience not as a static condition, but as the capacity of a system to absorb disturbance, reorganize, and continue functioning under stress (Bhamra et al., 2011; Bruneau et al., 2003).

The non-significant effect of non-military threats on geodefense capabilities and defense logistics readiness provides an important empirical insight. It suggests that threat perception alone is not sufficient to produce preparedness. In Jakarta's defense logistics context, cyber threats, ecological hazards, social disturbance, supply chain disruption, and coordination fragmentation may be recognized as serious risks, but recognition does not automatically create operational readiness. This finding is consistent with the view that resilience is shaped by the interaction between exposure, institutional capacity, and adaptive response, rather than by risk exposure alone (Cutter et al., 2008). Therefore, the weak statistical role of non-military threats should not be read as an indication that these threats are irrelevant. Instead, it indicates that perceived threats must be converted into concrete preparedness mechanisms before they can influence system readiness.

This result also challenges a linear threat-response assumption in defense logistics planning. A higher level of perceived threat does not necessarily lead to stronger readiness when the system lacks the institutional pathway to convert threat awareness into capability development. Urban logistics systems are connected to transport corridors, energy networks, digital systems, communication infrastructure, and public-sector coordination. Because these systems are interdependent, disruption in one sector can propagate into other sectors and create cascading consequences (Ouyang, 2014; Rinaldi et al., 2001). In such a setting, preparedness requires more than risk identification. It requires an integrated capability structure that can detect vulnerabilities, protect critical nodes, maintain alternative routes, coordinate decision-making, and restore functions rapidly.

The significant effect of policy integration and governance on geodefense capabilities confirms that governance remains a crucial enabling condition. Integrated governance can reduce fragmentation among institutions, align central and local priorities, and connect infrastructure operators with crisis-response mechanisms. This finding is consistent with the whole-of-government perspective, which argues that complex public problems require coordination across agencies, policy domains, and administrative boundaries (Christensen & Lægreid, 2007). Defense logistics readiness in Jakarta is a typical cross-boundary problem because it involves spatial planning, infrastructure protection, military-civil coordination, emergency management, cyber risk, and supply continuity. These characteristics make it closer to a wicked policy problem, where no single institution can fully define, control, or solve the problem independently (Head & Alford, 2015).

However, policy integration and governance do not directly improve defense logistics readiness in the structural model. This finding is theoretically and practically important. It means that coordination is not automatically equivalent to readiness. Policies, plans, and institutional alignment will remain limited if they do not produce operational geodefense capabilities. For defense logistics, this means that coordination must be translated into vulnerability mapping, protection of logistics corridors, hardening of critical facilities, continuity planning, integrated information systems, early warning mechanisms, trained personnel, and civil–military response procedures. Without this translation process, governance integration may exist administratively but fail to produce measurable readiness.

The full mediation effect of geodefense capabilities clarifies the mechanism through which policy integration contributes to defense logistics readiness. The insignificant direct effect and significant indirect effect show that policy integration works through capability formation. In practical terms, this means that governance reform should not stop at interagency coordination forums or policy synchronization documents. It must be assessed by whether it strengthens the actual layers of geodefense capability. The mediation finding therefore gives the study its main theoretical contribution: geodefense capabilities operate as the transmission mechanism that converts governance integration into defense logistics readiness.

The role of geodefense capabilities is especially important because the construct captures the multilayered nature of urban defense logistics. The spatial layer supports the identification of vulnerable infrastructure and strategic logistics corridors. The physical layer concerns facility protection, alternative routes, and redundancy. The systemic layer addresses cascading failure and continuity across sectors. The governance layer organizes command, authority, and crisis procedures. The technological and information layer enables data integration and early warning. The human-operational layer supports training, response speed, and civil–military coordination. This multilayered structure is consistent with infrastructure resilience thinking, which emphasizes robustness, redundancy, resourcefulness, and rapidity as key dimensions of resilient systems (Bruneau et al., 2003). It also aligns with supply chain resilience literature, which stresses that resilient logistics systems require flexibility, visibility, collaboration, and adaptive capacity (Christopher & Peck, 2004; Wieland & Durach, 2021).

The IPMA result adds a strategic layer to the interpretation. Geodefense capabilities have the highest importance but relatively lower performance compared with other antecedent constructs. This means that geodefense capabilities are not only statistically significant, but also the most urgent improvement priority. Increasing this construct would likely generate the greatest improvement in defense logistics readiness. By contrast, non-military threats have high performance but negative and non-significant importance, indicating that respondents already recognize the presence of threats, yet this awareness does not translate into readiness. The policy implication is clear: Jakarta should move from a threat-awareness orientation toward a capability-building orientation.

These findings are also relevant to the broader debate on supply network viability. Modern logistics systems are not isolated linear chains, but intertwined networks that must survive, adapt, and maintain essential flows during severe disruption (Ivanov & Dolgui, 2020). In Jakarta, defense logistics readiness depends on whether critical infrastructure, public agencies, security actors, and logistics operators can function as an integrated network under crisis conditions. A geodefense approach strengthens this network by connecting spatial intelligence, infrastructure protection, continuity planning, digital information, and operational response. Thus, the concept of geodefense capabilities can be positioned as a defense-oriented extension of supply chain resilience and infrastructure resilience.

The non-significant role of non-military threats further implies that planning systems should not treat threat assessment as an endpoint. Threat assessment must be connected to resource allocation, operational exercises, scenario planning, and infrastructure investment. Emergency management studies show that organizational resilience often depends on improvisation, communication, and the ability to reconstitute command functions when formal systems are disrupted (Kendra & Wachtendorf, 2003). For Jakarta, this means that logistics readiness requires repeated testing of crisis procedures, integrated simulations among civil and military actors, and clear mechanisms for activating alternative logistics routes and infrastructure support during disruption.

The study offers several practical implications. First, policy integration should be measured by capability outputs, not only by the existence of coordination mechanisms. Second, geodefense capability development should become a priority in defense logistics planning, especially in spatial vulnerability mapping, critical corridor protection, alternative route readiness, data integration, and joint crisis exercises. Third, infrastructure operators should be formally integrated into defense logistics governance because disruptions in energy, transport, communication, and digital systems can directly affect logistics continuity. Fourth, non-military threat assessment should be linked to operational planning so that cyber, ecological, social, and supply chain risks are converted into preparedness programs.

This study also has limitations. The analysis uses cross-sectional survey data, so the findings explain relationships among constructs at one point in time. Future research may use longitudinal data to examine whether improvements in policy integration produce measurable improvements in geodefense capabilities over time. The study is also based on perception-based indicators, so future studies should combine survey data with operational metrics, such as logistics recovery time, route redundancy, infrastructure downtime, stockpile distribution capacity, or crisis exercise performance. In addition, future research may test geodefense capabilities as a higher-order construct and compare the results across different metropolitan regions.

Overall, the findings show that defense logistics readiness in Jakarta is not driven directly by threat perception or policy integration alone. The decisive factor is the capacity to transform governance integration into operational geodefense capabilities. This confirms that geodefense capabilities are the core mechanism through which Jakarta can strengthen its ability to maintain logistics continuity, mobilize strategic resources, and sustain critical defense functions under complex non-military and hybrid disruption scenarios.

Conclusion

This study examined geodefense capabilities as a mediating mechanism between policy integration and defense logistics readiness in Jakarta. The findings demonstrate that defense logistics readiness is primarily shaped by operational geodefense capabilities rather than by non-military threat perception alone. Among the hypothesised relationships, policy integration and governance significantly improve geodefense capabilities, and geodefense capabilities significantly enhance defense logistics readiness. These results confirm that H3 and H5 are supported.

The study also finds that non-military threats do not have a significant direct effect on either geodefense capabilities or defense logistics readiness. Therefore, H1 and H2 are not supported. This indicates that the perception of cyber, ecological, social, supply chain, and coordination-related threats does not automatically lead to stronger logistics readiness.

Threat awareness needs to be translated into concrete institutional and operational capabilities before it can contribute to preparedness.

Another important finding is that policy integration and governance do not directly affect defense logistics readiness. Thus, H4 is not supported. However, the indirect effect through geodefense capabilities is significant, confirming that geodefense capabilities fully mediate the relationship between policy integration and defense logistics readiness. This means that policy integration becomes effective only when it is operationalized into spatial, physical, systemic, governance, technological, and human-operational capabilities.

The Importance–Performance Map Analysis further confirms the strategic role of geodefense capabilities. This construct shows the highest importance but relatively lower performance, making it the main priority for improvement. Strengthening geodefense capabilities is therefore expected to generate the greatest improvement in Jakarta's defense logistics readiness. In practical terms, this requires stronger vulnerability mapping, protection of critical logistics corridors, alternative route readiness, mitigation of cascading failures, integrated data systems, early warning mechanisms, clear crisis command structures, and regular civil–military operational exercises.

The main contribution of this study lies in showing that defense logistics readiness in a metropolitan context is not driven directly by threat perception or governance integration alone. Readiness depends on the ability to transform policy integration into multilayered geodefense capabilities. This provides a capability-based explanation of defense logistics readiness and highlights geodefense as a strategic mechanism for sustaining logistics continuity under complex non-military and hybrid disruption scenarios.

This study has several limitations. First, the analysis is based on cross-sectional survey data, so it cannot fully explain changes in readiness over time. Second, the data are perception-based and do not include direct operational performance indicators. Third, the study focuses on Jakarta, so the findings should be generalized carefully to other regions with different governance structures, infrastructure conditions, and risk profiles. Future research may use longitudinal designs, include objective logistics performance data, compare multiple metropolitan regions, and test geodefense capabilities as a higher-order construct to further validate the model.

Ethical considerations*

This study involved voluntary participation from adult respondents with relevant professional or academic knowledge of defense logistics, policy integration, infrastructure governance, and geodefense capabilities. The respondents were informed that their responses would be used only for academic research purposes. No personally identifiable information or sensitive personal data were collected through the questionnaire. The confidentiality of respondents was maintained, and all data were analysed and reported in aggregate form.

Back matter

Data availability

The data supporting the findings of this study were obtained from survey responses and analyzed using PLS-SEM techniques. While the raw dataset is not publicly shared to protect respondent confidentiality, de-identified data and analytical outputs are available from the corresponding author upon reasonable request.

Reporting guidelines*

This study is a quantitative survey-based analysis using PLS-SEM. Reporting follows established guidelines for quantitative empirical research, including transparent description of study design, sampling, measurement, and data analysis procedures.

Competing interests*

The authors declare no conflicts of interest.

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Figure legends

Figures have been uploaded to the submission as separate TIFF or JPEG files at >300dpi.

Tables

Table 1. Measurement model

Constructs	**Indicators**	**Outer loading**	**Cronbach's alpha**	**rho_A**	**Composite reliability**	**Average variance extracted**
Non-military threats	ANM1	0.818	0.820	0.841	0.867	0.622
	ANM2	0.813				
	ANM3	0.815				
	ANM5	0.701				
Policy integration and governanc	IKT1	0.806	0.865	0.867	0.903	0.650
	IKT2	0.766				

e	IKT3	0.853				
	IKT4	0.837				
	IKT5	0.765				
Geodefense capabilities	CAP 2	0.762	0.944	0.947	0.952	0.668
	CAP 3	0.754				
	CAP 4	0.800				
	CAP 6	0.851				
	CAP 7	0.844				
	CAP 8	0.828				
	CAP 9	0.877				
	CAP 10	0.856				
	CAP 11	0.776				
	CAP 12	0.812				
Defense logistics readiness	KLP 1	0.872	0.923	0.923	0.942	0.765
	KLP 2	0.911				
	KLP 3	0.905				
	KLP 4	0.864				
	KLP 5	0.818				

Source: Author (2026)

Table 2. Fornell–Larcker criterion

Constructs	(1)	(2)	(3)	(4)
(1) Non-military threats	0.789			
(2) Policy integration and governance	0.188	0.806		
(3) Geodefense capabilities	0.079	0.587	0.817	
(4) Defense logistics readiness	0.090	0.502	0.819	0.875

Source: Author (2026)

Note: Diagonal values represent the square root of AVE.

Table 3. Explanatory power and predictive relevance

Constructs	R^2	Q^2
Geodefense capabilities	0.296	0.192
Defense logistics readiness	0.599	0.451

Source: Author (2026)

Table 4. Model fit

Criteria	Model	Original sample	95%	99%
SRMR	Saturated model	0.071	0.081	0.106
	Estimated model	0.071	0.082	0.106
d_ULS	Saturated model	1.504	1.947	3.348
	Estimated model	1.504	2.023	3.380
d_G	Saturated model	0.907	0.702	0.934
	Estimated model	0.907	0.714	0.968

Source: Author (2026)

Table 5. Hypotheses result

Hypotheses	β	t-values	p-values	VIF	Decision
H1. Non-military threats -> Geodefense capabilities	-0.097	0.754	0.225	1.017	Not supported
H2. Non-military threats -> Defense logistics readiness	-0.075	1.152	0.125	1.031	Not supported
H3. Policy integration and governance -> Geodefense capabilities	0.548	7.478	0.000	1.017	Supported
H4. Policy integration and governance -> Defense logistics readiness	0.070	0.872	0.192	1.443	Not supported
H5. Geodefense capabilities -> Defense logistics readiness	0.729	9.758	0.000	1.420	Supported

Source: Author (2026)

Note: Significant at p-value level 0.05.

Table 6. Indirect and total effects

Effect	**Indirect effect β**	**t-values**	**Indirect effect decision**	**Total effect β**	**Total effect decision**
Non-military threats -> Geodefense capabilities	-	-	-	-0.097	Not significant
Non-military threats -> Defense logistics readiness	-0.071	0.753	Not significant	-0.145	Not significant
Policy integration and governance -> Geodefense capabilities	-	-	-	0.548	Significant
Policy integration and governance -> Defense logistics readiness	0.400	6.205	Significant	0.470	Significant
Geodefense capabilities -> Defense logistics readiness	-	-	-	0.729	Significant

Source: Author (2026)

Note: Significant at p-value level 0.05.

Table 7. IPMA result

Constructs	**Importance**	**Performance**
Non-military threats	-0.145	85.874
Policy integration and governance	0.470	61.457
Geodefense capabilities	0.729	53.479

Source: Author (2026)