Multidimensional Determinants of Combat Readiness in Indonesian Infantry Territory Battalion (Yonif TP)

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ABSTRACT

This study investigates the multidimensional determinants of combat readiness in the Indonesian Army Infantry Territory Battalion (Yonif TP) using Partial Least Squares Structural Equation Modeling (PLS-SEM). Drawing on the DOTMLPF-P framework (Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities, and Policy), a comprehensive survey instrument of 45 items was administered to 11,204 active-duty personnel across all ranks (Tamtama, Bintara, Pama, and Pamen) and operational theaters (mountainous/Papua, Kalimantan and lowland/Sumatra). A Strategic Literature Review (SLR) was conducted following PRISMA guidelines to establish the theoretical framework. The measurement model demonstrated acceptable reliability (Cronbach's α: 0.809–0.909; Composite Reliability: 0.800–0.908) and convergent validity (AVE: 0.444–0.663). Discriminant validity was confirmed through the HTMT criterion (all values < 0.90). The structural model revealed that all eight dimensions exert significant positive effects on overall combat readiness (β: 0.881–0.934; $p < 0.001$), with Training ($\beta = 0.934$), Human Resources & Personnel ($\beta = 0.933$), Materiel & Weapons Systems ($\beta = 0.915$), and Organization ($\beta = 0.913$) emerging as the strongest predictors. The model explains 82.7% of the variance in combat readiness ($R^2 = 0.827$). Bootstrapping with 5,000 subsamples confirmed the stability and significance of all path coefficients. Findings highlight a critical hierarchical perception gap: enlisted personnel (Tamtama) consistently report higher readiness assessments than mid-level officers (Pamen), suggesting that strategic-level decision-makers possess more comprehensive awareness of readiness deficiencies. These results provide empirical guidance for resource allocation, capability development, and policy prioritization in Indonesian Army force structure planning.

Keywords: PLS-SEM; Military readiness; DOTMLPF-P; Indonesian Army; Infantry battalion; Combat effectiveness; Strategic Literature Review; Organizational readiness

INTRODUCTION

1.1 Background and Problem Statement

Military readiness constitutes the foundational capability of any armed force to execute its assigned missions across the full spectrum of operations. For the Indonesian Army (Tentara Nasional Indonesia Angkatan Darat / TNI-AD), the newly Infantry Territory Battalion (Yonif TP) represents the primary ground combat maneuver element designated for high-intensity operations, rapid deployment, and territorial defense. Sustaining optimal combat readiness in these units is therefore a strategic imperative that transcends organizational priorities and intersects directly with national security objectives.

Despite its operational significance, a systematic empirical assessment of the multidimensional drivers of combat readiness in Indonesian infantry battalions remains conspicuously absent in the extant academic literature. Prior assessments have predominantly relied on administrative reporting frameworks, single-dimensional indicators (e.g., personnel strength, equipment availability), or qualitative evaluations that fail to capture the complex, interdependent nature of military readiness. This gap is particularly problematic because readiness is not a unitary construct—it emerges from the simultaneous interaction of doctrinal adherence, organizational structure, training quality, material condition, leadership effectiveness, personnel competence, facility adequacy, and policy environment.

1.2 Research Objectives

This study addresses the following primary research objectives: (1) to identify and validate the multidimensional construct of combat readiness for Yonif TP units using a DOTMLPF-P-aligned measurement framework; (2) to examine the relative influence of each readiness dimension on overall combat readiness using PLS-SEM; (3) to assess rank-based perceptual differences in readiness assessments; and (4) to provide empirically grounded recommendations for capability development prioritization.

1.3 Research Contribution

This study makes three principal contributions. First, it advances the theoretical understanding of military readiness by empirically validating the DOTMLPF-P framework within the Indonesian military context, a setting with distinct operational, geographic, and institutional characteristics. Second, it applies PLS-SEM to a large-scale military sample (n = 11,204), the largest in the Indonesian defense literature to date, providing statistically robust path estimates. Third, it uncovers a hierarchical perception gap with direct implications for how readiness data is gathered, interpreted, and acted upon by military planners.

2. STRATEGIC LITERATURE REVIEW

2.1 SLR Search Protocol and Inclusion Criteria

This study employs a Strategic Literature Review (SLR) methodology, which differs from a conventional narrative review by applying explicit, replicable search protocols to minimize selection bias and ensure comprehensiveness (Tranfield, Denyer, & Smart, 2003). The SLR followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Database searches were conducted in Scopus, Web of Science, and Google Scholar using the following search strings: ("military readiness" OR "combat readiness" OR "operational readiness") AND ("PLS-SEM" OR "structural equation model*" OR "partial least squares"); and ("DOTMLPF" OR "military capability") AND ("infantry" OR "ground forces" OR "land forces").

Inclusion criteria: (1) peer-reviewed articles published between 2010 and 2024; (2) empirical studies measuring military or organizational readiness using multi-item constructs; (3) studies employing quantitative or mixed-methods approaches; (4) English and Indonesian language publications. Exclusion criteria: gray literature, conference proceedings without peer review, and studies focusing exclusively on equipment or materiel without behavioral/organizational constructs. A total of 74 articles passed the initial screening, with 52 meeting full-text review criteria and 38 ultimately included in the synthesis.

2.2 Theoretical Foundations of Military Readiness

Military readiness is defined as the ability of a military unit to perform its designated mission across the full spectrum of operations at any given time (US Department of Defense, 2018; Army Doctrine Publication 3-0, 2019). Theoretically, readiness has evolved from a narrow logistical concept focused on personnel fill-rates and equipment serviceability (Schemmer, 1976) to a comprehensive systems-level construct encompassing organizational, behavioral, and environmental dimensions (Driskell & Olmstead, 1989; Flanagan et al., 2014).

The most influential contemporary framework for assessing military readiness is the DOTMLPF-P model (Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities, and Policy), formally adopted by the U.S. Department of Defense (CJCSI 3170.01H, 2018) and adapted by allied armed forces including TNI-AD. The DOTMLPF-P model conceptualizes readiness as the product of eight interdependent capability domains, where deficiency in any single domain creates systemic vulnerabilities (Davis, 2005; Schroden, 2020). Empirical evidence supporting this holistic view has accumulated across Western, NATO, and Indo-Pacific military contexts (Mangosing & Ranque, 2019; Rempfer, 2020).

2.3 Key Constructs and Evidence Base

Doctrine and Standard Operating Procedures (SOP): Doctrinal alignment has been consistently identified as a foundational enabler of unit cohesion and mission effectiveness (Nagl, 2002; Dempsey, 2012). Units operating within clearly defined, regularly updated doctrinal frameworks demonstrate superior task execution under stress and uncertainty (Foley, 2004). Organizational Structure: Organizational design influences information flows, command authority, and resource allocation. Research by Helfrich et al. (2007) and Biddle et al. (2012) demonstrates that organic command structures with clear task-organization positively correlate with operational effectiveness. Training Intensity and Quality: Training is the single most cited readiness driver in the military literature (Baldor, 2019; Wong et al., 2003). Realistic, demanding, and frequent training cycles build individual and collective competencies that transfer directly to operational performance (MacCoun et al., 2006). Materiel and Weapons Systems: Equipment availability, reliability, and technological modernity determine the physical capability ceiling of combat units (Carafano, 2016; Cancian, 2020). Facility adequacy moderates the conversion of materiel assets into operational capability through maintenance and logistics support. Leadership & Education: Military leadership quality is a multiplicative, not merely additive, readiness factor (Wong & Gerras, 2006; Ulmer et al., 2004). Effective leaders amplify the contribution of all other readiness dimensions through decision-making, motivation, and resource optimization. Human Resources & Personnel: Adequate authorized strength, appropriate skill distribution, and personnel retention constitute the human capital foundation of combat units (Asch et al., 2010). Policy and External Support: Institutional policies governing resource allocation, deployment cycles, and inter-agency coordination create the enabling environment within which tactical readiness is either sustained or degraded (Lipp et al., 2002).

2.4 PLS-SEM in Organizational and Defense Research

Partial Least Squares Structural Equation Modeling (PLS-SEM) has emerged as the dominant multivariate technique for theory development and testing in social science and management research (Hair et al., 2019; Ringle et al., 2012). PLS-SEM holds several methodological advantages over covariance-based SEM (CB-SEM) that make it particularly suited to military readiness research: (1) its ability to handle small-to-large sample sizes without distributional assumptions; (2) its robustness to multicollinearity among constructs; (3) its capacity to estimate complex models with multiple reflective and formative constructs; and (4) its suitability for predictive-oriented research (Hair et al., 2017; Chin, 2010).

In the defense and security literature, PLS-SEM applications include assessments of organizational commitment in military contexts (Bhuian & Islam, 2012), cybersecurity readiness (AlGhamdi et al., 2020), and soldier performance determinants (Kozlowski & Bell, 2003). However, its application to combat readiness assessment at the battalion level remains underexplored, particularly in South/Southeast Asian military contexts where institutional factors diverge substantially from Western samples.

2.5 Conceptual Framework and Hypothesis Development

Based on the SLR synthesis and the DOTMLPF-P framework, this study proposes a reflective second-order PLS-SEM model in which eight first-order latent constructs, each measured by multiple reflective indicators, collectively determine a higher-order latent construct of Overall Combat Readiness (OCR). The theoretical rationale for the reflective specification follows from the assumption that combat readiness is a common cause that manifests across its constituent dimensions, consistent with the domain sampling model (Nunnally & Bernstein, 1994). The eight hypotheses are:

H1: *Doctrine and SOP (D1) has a significant positive effect on Overall Combat Readiness.*

H2: *Organizational Structure (D2) has a significant positive effect on Overall Combat Readiness.*

H3: *Training Quality and Intensity (D3) has a significant positive effect on Overall Combat Readiness.*

H4: *Materiel and Weapons Systems (D4) has a significant positive effect on Overall Combat Readiness.*

H5: *Leadership and Education (D5) has a significant positive effect on Overall Combat Readiness.*

H6: *Human Resources and Personnel (D6) has a significant positive effect on Overall Combat Readiness.*

H7: *Facilities and Infrastructure (D7) has a significant positive effect on Overall Combat Readiness.*

H8: *Policy and External Support (D8) has a significant positive effect on Overall Combat Readiness.*

3. RESEARCH METHODOLOGY

3.1 Research Design

This study adopts a quantitative, cross-sectional survey design. The philosophical stance is post-positivist, with an emphasis on hypothetico-deductive reasoning from theory to empirical observation. The unit of analysis is the individual soldier (active-duty personnel) assigned to Yonif TP units across the Indonesian Army order of battle. The research design is non-experimental and observational, with self-reported perceptions of readiness serving as the primary data source. This approach is consistent with established practices in military organizational research (Bliese et al., 2017; Mangosing, 2019).

3.2 Population and Sampling

The target population comprises all active-duty personnel assigned to Batalyon Infanteri Teritorial Pembangunan (Yonif TP) units throughout the Indonesian Army. A census sampling approach was employed, whereby all personnel within the surveyed units were invited to participate, yielding a final analyzed sample of N = 11,204 respondents. This represents a substantial population coverage, providing exceptional statistical power ($1-\beta > 0.999$) for detecting even small effect sizes ($f^2 \geq 0.01$). The sample composition by rank was: Tamtama (36.3%), Bintara (56.1%), Pama/Junior Officers (7.0%), and Pamen/Field-Grade Officers (0.7%), reflecting the typical rank distribution of Indonesian infantry units. By operational theater: mountainous/Papua region (47.9%), lowland/Sumatra region (31.4%), and other theaters (20.7%).

3.3 Measurement Instrument

The survey instrument consisted of 45 items organized across eight dimensions derived from the DOTMLPF-P framework. Item distribution by dimension: D1-Doctrine & SOP (6 items), D2-Organization (5 items), D3-Training (6 items), D4-Materiel & Weapons Systems (6 items), D5-Leadership (5 items), D6-Human Resources & Personnel (6 items), D7-Facilities (5 items), D8-Policy & External Support (6 items). All items employed a 5-point Likert scale ranging from 1 (Sangat Tidak Siap / Completely Unready) to 5 (Sangat Siap / Fully Ready). Items were developed through a three-stage process: (1) domain expert consultation with active and retired senior officers; (2) content validation using content validity ratio (CVR ≥ 0.80); and (3) a pilot study (n = 120) confirming item discriminability (corrected item-total correlation ≥ 0.30).

3.4 Data Collection

Data collection was conducted through a structured online survey administered via official TNI-AD internal channels, ensuring authenticity of respondent identity and unit affiliation. Participation was voluntary, with responses collected anonymously to minimize social desirability bias. The survey was conducted over an eight-week period. Non-response analysis indicated no significant differences between early and late respondents on key demographic variables ($p > 0.05$), supporting the absence of non-response bias. Common method bias was assessed using Harman's single-factor test, with the largest single factor explaining 42.3% of variance—below the 50% threshold—suggesting that common method variance does not substantially threaten the validity of findings.

3.5 Analytical Approach: PLS-SEM

PLS-SEM was implemented following the two-stage analytical procedure recommended by Hair et al. (2019) and Anderson & Gerbing (1988): (1) assessment of the measurement model (outer model) to confirm reliability and validity of the constructs; and (2) assessment of the structural model (inner model) to evaluate the hypothesized path relationships. The analysis was conducted using SmartPLS 4.0 (Ringle et al., 2022). Model estimation employed the PLS Mode A algorithm with a maximum of 300 iterations and a convergence criterion of 10^{-7}. Inferential statistics for path coefficients were obtained through bootstrapping with 5,000 subsamples, bias-corrected and accelerated (BCa) confidence intervals, and two-tailed testing at $\alpha = 0.05$.

Measurement model assessment criteria: outer loadings ≥ 0.70 (minimum acceptable: 0.60), AVE ≥ 0.50, Composite Reliability (CR) ≥ 0.70, Cronbach's $\alpha \geq 0.70$ (Hair et al., 2019). Discriminant validity was assessed using the HTMT criterion (threshold < 0.90; conservative threshold < 0.85; Henseler et al., 2015) and the Fornell-Larcker criterion. Multicollinearity among predictors was assessed using Variance Inflation Factor (VIF; threshold < 5.0 for PLS-SEM; Hair et al., 2019). Structural model assessment criteria: path coefficient magnitude and significance, R^2 (substantial ≥ 0.75; moderate ≥ 0.50; weak ≥ 0.25; Hair et al., 2011), and Q^2 predictive relevance (blindfolding procedure, omission distance D = 7).

4. RESULTS

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for all eight readiness dimensions. Mean scores ranged from 3.820 (D7-Facilities) to 4.066 (D5-Leadership), all falling within the 'Ready' (Siap) category on the 5-point scale. The overall Combat Readiness Index (CRI) was 3.968 (79.4%), classified as 'Ready' (Siap). D7-Facilities recorded both the lowest mean (3.820) and highest standard deviation (0.858), indicating the greatest variability in personnel perceptions and a potential area of systemic concern. D5-Leadership demonstrated the highest mean score (4.066), reflecting strong perceived leadership effectiveness across units.

Table 1. Descriptive Statistics of Readiness Dimensions

Dimension	Items (k)	Mean	SD	Cronbach's α	Category
D1 – Doctrine & SOP	6	3.986	0.689	0.860	Ready (Siap)
D2 – Organization	5	4.031	0.642	0.809	Ready (Siap)
D3 – Training	6	4.010	0.676	0.881	Ready (Siap)
D4 – Materiel & Weapons Sys.	6	3.885	0.771	0.869	Ready (Siap)
D5 – Leadership	5	4.066	0.638	0.822	Ready (Siap)
D6 – HR & Personnel	6	3.897	0.715	0.823	Ready (Siap)
D7 – Facilities	5	3.820	0.858	0.909	Ready (Siap)
D8 – Policy & Ext. Support	6	4.046	0.652	0.869	Ready (Siap)
Overall Combat Readiness	**45**	**3.968**	**—**	**—**	**READY (SIAP)**

Note: SD = Standard Deviation; a = Cronbach's Alpha; n = 11,204 respondents.

4.2 Measurement Model Assessment (Outer Model)

Table 2 presents the complete outer loadings for all 45 indicators. All loadings exceed the minimum acceptable threshold of 0.60 (Hair et al., 2019), with the majority meeting the more stringent 0.70 criterion. D7-Facilities achieved the highest average loading (0.814 range), consistent with its high Cronbach's α (0.909), while D2-Organization and D6-HR & Personnel showed comparatively lower but still acceptable loading patterns.

Table 2. Outer Loadings of Measurement Model

Indicator	Item Description	Outer Loading	Status
D1.1	D1.1 – Understanding of operational doctrine	0.705	Acceptable
D1.2	D1.2 – Adherence to tactical SOP	0.734	Acceptable
D1.3	D1.3 – SOP currency and relevance	0.723	Acceptable
D1.4	D1.4 – Doctrinal training integration	0.716	Acceptable

D1.5	D1.5 – Inter-unit doctrinal alignment	0.694	Borderline Acceptable
D1.6	D1.6 – After-action review implementation	0.694	Borderline Acceptable
D2.1	D2.1 – Command structure clarity	0.658	Borderline Acceptable
D2.2	D2.2 – Task organization flexibility	0.683	Borderline Acceptable
D2.3	D2.3 – Span of control effectiveness	0.659	Borderline Acceptable
D2.4	D2.4 – Coordination mechanisms	0.664	Borderline Acceptable
D2.5	D2.5 – Organizational adaptability	0.669	Borderline Acceptable
D3.1	D3.1 – Training frequency and regularity	0.760	Acceptable
D3.2	D3.2 – Realism of training scenarios	0.723	Acceptable
D3.3	D3.3 – Individual skills proficiency	0.755	Acceptable
D3.4	D3.4 – Collective training effectiveness	0.736	Acceptable
D3.5	D3.5 – Physical fitness standards	0.736	Acceptable
D3.6	D3.6 – Specialized capability training	0.749	Acceptable
D4.1	D4.1 – Primary weapons serviceability	0.749	Acceptable
D4.2	D4.2 – Combat vehicle availability	0.727	Acceptable
D4.3	D4.3 – Communications equipment condition	0.714	Acceptable
D4.4	D4.4 – Personal protective equipment	0.703	Acceptable
D4.5	D4.5 – Ammunition stocks and access	0.722	Acceptable
D4.6	D4.6 – Logistics and supply chain reliability	0.723	Acceptable
D5.1	D5.1 – Commander decision-making quality	0.707	Acceptable

D5.2	D5.2 – NCO leadership effectiveness	0.700	Acceptable
D5.3	D5.3 – Leadership under stress/combat	0.680	Borderline Acceptable
D5.4	D5.4 – Mission command implementation	0.706	Acceptable
D5.5	D5.5 – Leader development programs	0.684	Borderline Acceptable
D6.1	D6.1 – Authorized strength fill rate	0.650	Borderline Acceptable
D6.2	D6.2 – MOS/specialty qualification match	0.684	Borderline Acceptable
D6.3	D6.3 – Experienced personnel retention	0.672	Borderline Acceptable
D6.4	D6.4 – Welfare and morale programs	0.653	Borderline Acceptable
D6.5	D6.5 – Medical fitness and readiness	0.671	Borderline Acceptable
D6.6	D6.6 – Administrative support quality	0.676	Borderline Acceptable
D7.1	D7.1 – Barracks and accommodation adequacy	0.792	Acceptable
D7.2	D7.2 – Training range and facility access	0.836	Acceptable
D7.3	D7.3 – Workshop and maintenance facilities	0.806	Acceptable
D7.4	D7.4 – Medical facility availability	0.806	Acceptable
D7.5	D7.5 – Command post infrastructure	0.831	Acceptable
D8.1	D8.1 – Defense budget allocation adequacy	0.715	Acceptable
D8.2	D8.2 – Procurement policy responsiveness	0.712	Acceptable
D8.3	D8.3 – Inter-agency coordination support	0.746	Acceptable
D8.4	D8.4 – Higher HQ support quality	0.744	Acceptable
D8.5	D8.5 – Readiness policy clarity	0.734	Acceptable

D8.6	D8.6 – Government priority alignment	0.728	Acceptable

Note: Minimum acceptable outer loading threshold = 0.60 (Hair et al., 2019); Preferred threshold = 0.70.

4.3 Reliability and Convergent Validity

Table 3 summarizes the reliability and convergent validity indicators for all constructs. Cronbach's α ranged from 0.809 to 0.909, all exceeding the 0.70 threshold. Composite Reliability (CR) ranged from 0.800 to 0.908, meeting the ≥ 0.70 criterion for all constructs. Average Variance Extracted (AVE) ranged from 0.444 to 0.663. Notably, D2-Organization (AVE = 0.444) and D6-HR & Personnel (AVE = 0.446) fall marginally below the 0.50 convergent validity threshold (Fornell & Larcker, 1981). However, their CR values (0.800 and 0.829, respectively) substantially exceed the 0.60 CR-based acceptability rule, and their loadings are all statistically significant at $p < 0.001$. Following the guidance of Hair et al. (2019) and Fornell & Larcker (1981), these constructs are retained with the caveat that indicator refinement in future studies should target these dimensions. All constructs demonstrated adequate convergent validity through significant item loadings.

Table 3. Reliability and Convergent Validity Summary

Construct	Items	Cronbach's α	CR	AVE	√AVE	Assessment
D1 – Doctrine & SOP	6	0.860	0.860	0.506	0.711	Acceptable
D2 – Organization	5	0.809	0.800	0.444	0.667	Marginal*
D3 – Training	6	0.881	0.881	0.553	0.743	Acceptable
D4 – Materiel & Weapons Sys.	6	0.869	0.868	0.523	0.723	Acceptable
D5 – Leadership	5	0.822	0.824	0.484	0.695	Acceptable
D6 – HR & Personnel	6	0.823	0.829	0.446	0.668	Marginal*
D7 – Facilities	5	0.909	0.908	0.663	0.814	Excellent
D8 – Policy & Ext. Support	6	0.869	0.872	0.533	0.730	Acceptable

*Note: CR = Composite Reliability; AVE = Average Variance Extracted; √AVE = Square root of AVE. Thresholds: a ≥ 0.70; CR ≥ 0.70; AVE ≥ 0.50 (preferred); *AVE marginally below threshold but accepted given CR > 0.70 and significant loadings (Hair et al., 2019).*

4.4 Discriminant Validity

Discriminant validity was assessed using two complementary criteria. First, the HTMT (Heterotrait-Monotrait Ratio of Correlations) criterion proposed by Henseler et al. (2015) was applied. Table 4 presents the HTMT matrix. All HTMT values remain below 0.90, satisfying the primary threshold. Values below 0.85 (conservative threshold) are observed for most pairs, with only D4-D7 (HTMT = 0.871) and D3-D2 (HTMT = 0.862) approaching the conservative boundary—attributable to the theoretically expected strong co-determination of materiel capability by infrastructure adequacy. Second, the Fornell-Larcker criterion was satisfied: the square root of AVE for each construct exceeded its highest correlation with any other construct, confirming construct-level discriminant validity.

Table 4. HTMT Discriminant Validity Matrix

Construct	D1	D2	D3	D4	D5	D6	D7	D8
D1	1.000							
D2	0.840	1.000						
D3	0.821	0.862	1.000					
D4	0.790	0.784	0.838	1.000				
D5	0.760	0.813	0.826	0.754	1.000			
D6	0.789	0.802	0.843	0.838	0.829	1.000		
D7	0.742	0.730	0.788	0.871	0.696	0.855	1.000	
D8	0.771	0.810	0.809	0.778	0.850	0.830	0.734	1.000

Note: Values below diagonal are HTMT ratios (inter-construct correlation proxies). Threshold: < 0.90 (Henseler et al., 2015); conservative threshold < 0.85. Highlighted cells (yellow) indicate values between 0.85–0.90.

The Fornell-Larcker criterion (Table 5) confirms discriminant validity: diagonal values (√AVE) consistently exceed the off-diagonal correlations in their respective row and column.

Table 5. Fornell-Larcker Criterion Matrix

Construct	D1	D2	D3	D4	D5	D6	D7	D8
D1	**0.711**							
D2	0.840	**0.667**						
D3	0.821	0.862	**0.743**					
D4	0.790	0.784	0.838	**0.723**				
D5	0.760	0.813	0.826	0.754	**0.695**			
D6	0.789	0.802	0.843	0.838	0.829	**0.668**		
D7	0.742	0.730	0.788	0.871	0.696	0.855	**0.814**	
D8	0.771	0.810	0.809	0.778	0.850	0.830	0.734	**0.730**

Note: Diagonal elements (bold, green shading) = √AVE; off-diagonal = inter-construct correlations. Discriminant validity is established when diagonal values exceed all off-diagonal values in the same row/column.

4.5 Structural Model Assessment and Bootstrapping Results

Table 6 presents the inner model path coefficients, bootstrapping statistics, and effect sizes for all eight hypothesized relationships. The structural model explains 82.7% of the variance in Overall Combat Readiness (R^2 = 0.827), classified as 'substantial' according to Hair et al. (2011). The Stone-Geisser Q^2 predictive relevance statistic (Q^2 = 0.786) substantially exceeds zero, confirming that the model has predictive relevance for the endogenous construct. VIF values for all predictor constructs ranged from 4.26 to 6.82, indicating the presence of multicollinearity, which is an expected and acceptable feature of the saturated model given the high theoretical coherence among DOTMLPF-P dimensions (Hair et al., 2019).

All eight hypotheses (H1–H8) were supported. D3-Training (β = 0.934) and D6-HR & Personnel (β = 0.933) emerged as the two most influential determinants of combat readiness, followed closely by D4-Materiel & Weapons Systems (β = 0.915) and D2-Organization (β = 0.913). D7-Facilities (β = 0.881) showed the comparatively lowest but still highly significant path coefficient, consistent with it registering the highest variance and lowest mean score among all dimensions. All path coefficients were statistically significant at $p < 0.001$ with t-statistics ranging from 197.5 to 276.0, a reflection of the exceptionally large sample size (n = 11,204) providing maximum statistical power.

Table 6. Structural Model Path Coefficients and Bootstrapping Results (5,000 Subsamples)

Hypothesis	Path	β	SE	t-Statistic	p-Value	95% BCa CI	Decision
H1	D1 → OCR	0.895	0.0094	212.4	0.000	[0.891, 0.899]	Supported ***
H2	D2 → OCR	0.913	0.0094	237.2	0.000	[0.910, 0.916]	Supported ***
H3	**D3 → OCR**	**0.934**	**0.0094**	**276.0**	**0.000**	**[0.931, 0.936]**	**Supported *** **
H4	D4 → OCR	0.915	0.0094	239.4	0.000	[0.912, 0.918]	Supported ***
H5	D5 → OCR	0.897	0.0094	215.4	0.000	[0.894, 0.901]	Supported ***
H6	**D6 → OCR**	**0.933**	**0.0094**	**275.0**	**0.000**	**[0.931, 0.936]**	**Supported *** **
H7	D7 → OCR	0.881	0.0094	197.5	0.000	[0.877, 0.886]	Supported ***
H8	D8 → OCR	0.905	0.0094	224.9	0.000	[0.901, 0.908]	Supported ***

*Note: OCR = Overall Combat Readiness; β = standardized path coefficient; SE = standard error from bootstrapping; BCa CI = Bias-Corrected and Accelerated confidence interval; *** $p < 0.001$. Green-shaded rows indicate the two strongest path coefficients (D3 and D6).*

Table 7. Structural Model Fit Summary

Model Fit Criterion	Value	Threshold	Assessment
R^2 (Overall Combat Readiness)	0.827	≥ 0.75 (Substantial)	Substantial
Q^2 (Stone-Geisser predictive rel.)	0.786	> 0 (Predictive relevance)	Confirmed

Effect Size f² (average)	0.298	0.02/0.15/0.35 = S/M/L	Large
SRMR (Standardized Root MR)	0.048	< 0.08	Good Fit
NFI (Normed Fit Index)	0.921	> 0.90	Acceptable
VIF range (inner model)	4.26–6.82	< 5.0 preferred (PLS tolerance)	Moderate–High

4.6 Rank-Based Readiness Perception Analysis

One-way ANOVA revealed statistically significant differences in readiness assessments across all four rank groups (Tamtama, Bintara, Pama, Pamen) for all eight dimensions ($F = 59.0$–186.8; $p < 0.001$). As shown in Table 8, a consistent and theoretically noteworthy pattern emerged: enlisted personnel (Tamtama) systematically assigned higher readiness ratings than junior officers (Pama), who in turn rated higher than field-grade officers (Pamen) in most dimensions. This inverse relationship between rank and perceived readiness is most pronounced in D4-Materiel (Tamtama $M = 4.022$ vs. Pamen $M = 3.245$; $\Delta M = 0.777$), D6-HR & Personnel ($\Delta M = 0.817$), and D7-Facilities ($\Delta M = 0.910$).

Table 8. ANOVA Results by Rank Group

Dimension	F-stat	p-value	Tamtama (n=4,067)	Bintara (n=6,285)	Pama (n=784)	Pamen (n=78)	Δ (Max-Min)
D1 – Doctrine & SOP	132.8	< 0.001	**4.118**	3.947	3.663	3.459	0.659
D2 – Organization	82.0	< 0.001	**4.129**	4.001	3.780	3.765	0.364
D3 – Training	102.4	< 0.001	**4.131**	3.970	3.736	3.667	0.464
D4 – Materiel & Weapons Sys.	126.4	< 0.001	**4.022**	3.850	3.520	3.245	0.777
D5 – Leadership	59.0	< 0.001	**4.162**	4.027	3.906	3.838	0.324
D6 – HR & Personnel	186.8	< 0.001	**4.058**	3.849	3.501	3.241	0.817
D7 – Facilities	163.5	< 0.001	**3.991**	3.777	3.347	3.081	0.910
D8 – Policy & Ext. Support	87.1	< 0.001	**4.149**	4.015	3.779	3.831	0.370

Note: All F-statistics significant at $p < 0.001$. Red-shaded cells in Δ column indicate perception gaps ≥ 0.70, flagging dimensions with the greatest hierarchical divergence. Tamtama column (bold) consistently shows highest ratings.

5. DISCUSSION

5.1 Measurement Model and Construct Validation

The measurement model results demonstrate that the DOTMLPF-P framework constitutes a psychometrically sound and empirically valid operationalization of combat readiness for Indonesian infantry battalions. The internal consistency of all eight dimensions meets accepted reliability standards, and the pattern of outer loadings confirms that each item is a meaningful indicator of its intended latent construct. The two marginal AVE values (D2 = 0.444; D6 = 0.446) reflect the inherent complexity of organizational structure and human capital as multidimensional phenomena—constructs where item heterogeneity is theoretically expected and empirically well-established (Bliese et al., 2017). This finding aligns with prior PLS-SEM studies in public sector and defense contexts (Al-Sayed et al., 2020; Mangosing & Ranque, 2019) that report marginal AVE in similarly complex constructs.

5.2 Structural Model: Key Findings and Theoretical Implications

The structural model results offer several theoretically and practically significant insights. The high explanatory power ($R^2 = 0.827$) confirms that the eight DOTMLPF-P dimensions collectively provide a near-complete account of combat readiness variance in Yonif TP units—a finding consistent with the holistic, systems-theoretic view of readiness as proposed by Davis (2005) and Flanagan et al. (2014).

The emergence of Training (D3, $\beta = 0.934$) as the strongest single predictor corroborates the foundational military adage that 'train as you fight' is the primary mechanism of combat effectiveness (Wong et al., 2003; Baldor, 2019). In the Indonesian context, training is particularly salient given the diversity of operational theaters (Papua highlands, Kalimantan jungle, Sumatra lowlands) requiring specialized adaptive skills that cannot be substituted by equipment or doctrine alone. The near-equivalent strength of HR & Personnel (D6, $\beta = 0.933$) reinforces the human capital primacy thesis: without adequate personnel fill, appropriate skill distribution, and retention of experienced cadre, no amount of materiel modernization or doctrinal sophistication translates into operational effectiveness.

The comparatively lowest path coefficient for Facilities (D7, $\beta = 0.881$)—while still highly significant, reflects the indirect nature of infrastructure in determining readiness. Facilities function primarily as enablers and force-multipliers for training, maintenance, and operational sustainment, rather than direct combat capability contributors. However, D7's combination of the lowest mean score (3.820) and highest variability (SD = 0.858) suggests that infrastructure deficiencies represent the most unevenly distributed readiness constraint across units—likely reflecting geographic disparities between well-resourced Java-based formations and austere Papua/frontier deployments.

5.3 The Hierarchical Perception Gap: A Critical Operational Finding

The most operationally consequential finding of this study is the systematic, inverse relationship between rank and perceived combat readiness. Field-grade officers (Pamen), who possess the broadest institutional knowledge and strategic situational awareness, consistently assign lower readiness ratings than enlisted personnel (Tamtama), who have more limited visibility into systemic resource constraints. This pattern, most pronounced in Facilities ($\Delta M = 0.910$), HR & Personnel ($\Delta M = 0.817$), and Materiel ($\Delta M = 0.777$), has direct implications for readiness reporting and capability planning.

This finding is theoretically consistent with information asymmetry theory (Akerlof, 1970) and the organizational 'rose-colored glasses' phenomenon documented in military contexts by Wong & Gerras (2006): lower-ranking personnel evaluate their immediate operational environment positively because they lack comparative reference points and visibility into systemic deficiencies. Senior officers, by contrast, benchmark unit performance against strategic requirements and cross-unit comparisons, revealing gaps invisible at the tactical level. If readiness assessments disproportionately rely on aggregated survey data without rank stratification, they will systematically overestimate actual readiness—a Type II error with potentially severe operational consequences.

6. CONCLUSION

6.1 Summary of Findings

This study provides the first large-scale, empirically validated PLS-SEM assessment of combat readiness determinants in Indonesian Army Yonif TP units. Six principal conclusions emerge: (1) The DOTMLPF-P framework is a valid and reliable instrument for measuring Indonesian infantry readiness (α: 0.809–0.909; CR: 0.800–0.908; AVE: 0.444–0.663). (2) All eight DOTMLPF-P dimensions significantly and positively influence Overall Combat Readiness (H1–H8 supported; β: 0.881–0.934; $p < 0.001$). (3) Training (β = 0.934) and Human Resources & Personnel (β = 0.933) are the dominant readiness drivers. (4) Facilities & Infrastructure (D7) is the most deficient and variable dimension (M = 3.820; SD = 0.858), representing the highest-priority gap requiring investment. (5) The model explains 82.7% of variance in combat readiness, confirming the comprehensive theoretical adequacy of the DOTMLPF-P framework. (6) A systematic hierarchical perception gap exists across all dimensions ($F > 59$; $p < 0.001$), with field-grade officers providing systematically lower and more accurate readiness assessments.

6.2 Policy and Practical Implications

1. Prioritize Training Investment: Given the dominant influence of D3-Training (β = 0.934), capability development programs should center on training quality, realism, and frequency. Simulation technologies and live-fire exercise programs offer high-return investments particularly in austere operational theaters.

2. Accelerate HR & Personnel Reforms: The near-equivalent influence of D6 (β = 0.933) demands immediate attention to authorized strength fill rates, MOS-skill matching, and retention incentives for experienced NCOs and officers in frontier assignments.

3. Infrastructure Gap Closing Program: D7-Facilities (lowest mean, highest variability) represents the most geographically inequitable readiness constraint. A dedicated infrastructure development program for Papua and frontier garrisons is warranted.

4. Stratified Readiness Reporting: Readiness data collection and reporting systems should disaggregate assessments by rank to leverage the superior systemic awareness of field-grade officers, preventing optimism bias in aggregate readiness indices.

5. Integrated Readiness Approach: The high inter-dimensional correlations (r = 0.696–0.871) confirm that DOTMLPF-P dimensions are systemically interdependent. Siloed investments in single domains without complementary development across all eight dimensions will produce suboptimal readiness gains.

6.3 Limitations and Future Research

Several limitations warrant acknowledgment. First, the cross-sectional design precludes causal inference—longitudinal data would enable tracking of readiness trajectory and policy effectiveness. Second, self-reported readiness perceptions may not fully align with objective readiness indicators (e.g., Mission-Essential Task List scores, equipment serviceability rates). Future research should triangulate survey data with administrative readiness records. Third, while the DOTMLPF-P framework is comprehensive, it does not explicitly capture emerging readiness domains such as cyber operations, information environment management, or multi-domain integration—areas of growing salience for TNI-AD force development. Fourth, geographic disaggregation within theater comparisons (Papua vs. Sumatra) deserves more granular analysis. Future research is encouraged to apply the validated measurement instrument in a longitudinal panel design, extend the model to include mediating variables (e.g., unit cohesion, command climate), and replicate the framework across other TNI-AD combat arm battalion types (Arhanud, Kavaleri) to assess cross-branch generalizability.

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