

## The Impact of Law No. 16/2012 on the Development of Indonesia's Defense Industry Ecosystem

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### ABSTRACT

This study critically examines the strategic impact of Law No. 16/2012 on the development of Indonesia's defense industry ecosystem. Adopting a qualitative descriptive approach through a systematic literature review, the analysis focuses on regulatory frameworks, institutional roles, offset mechanisms, and technology transfer. The findings reveal that while the law provides a robust legal foundation for defense industrial revitalization, its implementation has been hindered by fragmented coordination, insufficient private sector integration, and limited absorptive capacity in technology transfer programs. The study identifies key structural constraints, including underinvestment in research and development (R&D), a narrow domestic market, and persistent reliance on state-owned enterprises (SOEs). Policy recommendations include the establishment of a centralized offset authority, enhanced public-private partnerships, and targeted human capital investment to strengthen Indonesia's strategic autonomy. By integrating a decade's worth of policy developments and performance trends, this research offers an ecosystem-based perspective that has been largely absent from previous studies, thereby contributing to both academic discourse and policy formulation in the defense sector.

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## **INTRODUCTION**

The defense industry is a critical pillar for national sovereignty, technological independence, and economic security. In the Indo-Pacific strategic environment, where regional competition is intensifying, the ability to domestically produce defense equipment is no longer optional but essential (Damanik et al., 2024). The enactment of Law No. 16 of 2012 on the Defense Industry marked a significant milestone in Indonesia's journey toward building a self-reliant, structured, and sustainable defense ecosystem. The law outlines mechanisms such as domestic production prioritization, technology transfer through offset arrangements, and the integration of both state-owned and private sectors (Baiquni et al., 2022).

Over the past decade, state-owned enterprises (SOEs) such as PT Pindad, PT PAL, and PT Dirgantara Indonesia have achieved partial success in producing small arms, naval platforms, and transport aircraft (Praditya et al., 2023). Indonesia's participation in joint production schemes and its hosting of the Indo Defense Expo reflect aspirations to position itself in the global defense market. However, the industry still faces substantial challenges, including dependency on foreign components, inconsistent enforcement of local content (TKDN) requirements, and underdeveloped innovation capacity (Waskito et al., 2023). The implementation of the Domestic Component Level (TKDN) policy has not always been consistent or effectively monitored, and the offset requirements in foreign procurements are often not fully enforced (Baiquni et al., 2022). Coordination among key stakeholders including the Ministry of Defense, defense enterprises, academia, and the private sector remains fragmented. As a result, domestic industries are often sidelined in major defense procurement processes due to perceived limitations in meeting technical specifications or delivery timelines (Damanik et al., 2024).

In the National Medium-Term Development Plan (RPJMN) (2020-2024) and the Defense White Paper (2015), the defense industry is identified as a strategic sector with a multiplier effect for national resilience. However, in practice, many of these goals are still aspirational. Key performance indicators such as the growth of domestic production, local content percentage, and export readiness have not consistently met expectations (Damanik et al., 2024).

This gap between policy intent and practical outcomes has limited the realization of the law's vision: a competitive and innovative national defense industry capable of meeting the Indonesian National Armed Forces' (TNI) operational needs while contributing to national economic resilience (Kasim & Deksino, 2022). Although numerous studies have addressed individual components such as offset implementation or SOE performance, few have examined the defense industry from a holistic ecosystem perspective that integrates regulatory, institutional, technological, and market dynamics over time. There is currently no comprehensive literature review that consolidates findings from the past decade to assess the broader impact of Law No. 16/2012 on the defense industry ecosystem.

Accordingly, this study aims to assess the broader, long-term impacts of Law No. 16/2012 on Indonesia's defense industry ecosystem. It focuses on the

interplay between policy design, institutional structures, and capability development, seeking to identify both the achievements and persistent bottlenecks that have influenced the industry's trajectory. The primary aim of this research is to conduct a critical and comprehensive literature review on the implementation and impact of Law No. 16/2012, examining its role in shaping a modern, resilient, and autonomous defense industry in Indonesia

## LITERATURE REVIEW

### *Policy Framework of Law No.16/2012*

Law No. 16/2012 serves as Indonesia's primary legal framework for defense industry development. It mandates the use of local content (TKDN), the implementation of technology transfer through offset programs, and the clustering of defense industries to promote innovation and self-reliance (Baiquni et al., 2022). The law assumes that legal certainty will drive industrial competitiveness aligned with national defense needs (Waskito et al., 2023). It also directs the government to support long-term investment, procurement planning, and technology acquisition. Despite its strategic vision, implementation challenges persist. Regulatory fragmentation and overlapping authority among ministries hinder effective enforcement. Moreover, the absence of clear performance benchmarks weakens accountability, limiting the law's transformative potential (Baiquni et al., 2022).

Table 1. Key Policy Milestones Affecting the Defense Industry (2012–2024)

Year	Policy/Regulation	Key Provisions	Implications
2012	Law No. 16/2012	TKDN, offset, tech transfer	Foundation for self-reliance
2020	Law No. 11/2020 (Job Creation)	Private/foreign investment allowed in all tiers	Market liberalization
2021	Presidential Reg. No. 8/2021	Expanded strategic tech priorities from 7 to 10	Broader capability scope
2024	National Defense Council established	Strategic advisory & coordination role	Potential for improved policy coherence

*Source: Compiled by the Author*

### *Indonesia's Defense Industry Ecosystem*

The Indonesian defense industry ecosystem comprises the Ministry of Defense, the TNI, SOEs, private sector firms, universities, and research institutions. While ideally these actors would function in synergy, empirical evidence shows persistent fragmentation and weak integration. (Damanik et al., 2024). The lack of synergy between research, procurement, and production has hindered the emergence of a robust, innovative defense manufacturing base. Short-term, project-based collaborations dominate the research landscape, limiting innovation continuity. Government support for defense R&D remains

minimal compared to civilian sectors, and there is no national roadmap to guide defense research and development efforts(Praditya et al., 2023).

Moreover, the defense sector operates under a centralized command structure dominated by the Ministry of Defense, which limits the proactive involvement of non-government actors. This structure inhibits the creation of effective public-private partnerships and reduces the role of universities and research institutions in contributing to defense innovation. Without systemic integration across stakeholders, Indonesia’s defense industry ecosystem struggles to adapt to technological advances and to respond efficiently to emerging regional security dynamics.

***The Role of State-Owned Enterprises (SOEs)***

Indonesia’s state-owned enterprises, PT Pindad, PT PAL, and PT Dirgantara Indonesia constitute the backbone of the defense production sector. Each plays a specialized role in land, sea, and air systems respectively. Despite improvements, they face structural constraints such as reliance on government contracts and limited R&D (Baiquni et al., 2022). Table 2 below outlines the domain focus, core outputs, and key challenges of each major SOE within Indonesia’s defense ecosystem.

Table 2. Major State-Owned Enterprises (SOEs) in Indonesia’s Defense Industry

SOE	Domain	Main Products & Capabilities	Challenges
<b>PT Pindad</b>	Land-based systems	Assault rifles (e.g., SS2), ammunition, armored vehicles (e.g., Anoa), tactical support vehicles	Limited scalability, innovation lag, high dependency on government contracts
<b>PT PAL Indonesia</b>	Maritime /naval systems	Landing Platform Docks (LPDs), fast attack crafts, submarines (e.g., KRI Alugoro-405), shipbuilding with tech cooperation (e.g., South Korea’s DSME)	Long production cycles, dependency on foreign design, limited indigenous systems integration
<b>PT Dirgantara Indonesia</b>	Aerospace & air systems	CN-235 and N-219 aircraft, light helicopters, MRO (maintenance/repair/overhaul), joint development with Airbus and CASA	Financial instability, weak R&D continuity, certification and competitiveness issues in global markets

Source: Compiled by the Author

The 2022 consolidation into DEFEND ID improved coordination but created potential conflicts between commercial and strategic priorities. Moreover, the presence of political interests and the lack of accountability mechanisms often lead to inefficiencies and missed opportunities in procurement planning and execution. As such, although SOEs are strategically positioned to fulfill the objectives of Law No. 16/2012, structural and institutional reforms are necessary to optimize their performance.

### *Technology Transfer and Offset Programs*

Technology transfer is one of the central pillars of Law No. 16/2012, with offset programs serving as a key mechanism for absorbing knowledge and advancing domestic technical capabilities. In theory, foreign defense suppliers are required to provide technological input, training, and joint development opportunities as a condition for participating in Indonesia's defense market. However, in practice, offset agreements are often limited to basic assembly activities with minimal impact on local R&D capacity (Kasim & Deksino, 2022). The lack of structured guidelines and monitoring tools further undermines the potential of these programs.

Waskito et al. (2023) note that there is an urgent need for reform in how offset programs are designed, executed, and evaluated. Many foreign defense transactions fail to generate long-term capacity building or innovation, and local industries often lack the readiness or technical base to absorb sophisticated technologies. To achieve strategic autonomy, Indonesia must enhance institutional readiness, develop clear offset enforcement strategies, and invest in long-term capability development. Without these efforts, the vision of technological independence as envisioned in Law No. 16/2012 may remain aspirational.

## **METHODOLOGY**

This study employs a qualitative descriptive design with a systematic literature review approach to analyze the impact of Law No. 16/2012 on the development of Indonesia's defense industry ecosystem. Literature was collected from peer-reviewed journal articles, official government publications, policy papers, and legal documents published between 2012 and 2025. The inclusion criteria required that selected sources explicitly address the defense industry in relation to Law No. 16/2012, while exclusion criteria omitted purely theoretical works without empirical or policy relevance.

The data were analyzed using thematic content analysis by identifying and grouping findings into key themes: regulatory framework, institutional coordination, State-Owned Enterprises (SOEs) performance, private sector participation, technology transfer, and structural challenges. Triangulation was conducted by cross-referencing multiple sources for each theme to ensure the validity and reliability of interpretations.

## RESEARCH RESULT AND DISCUSSION

### *Regulatory and Regulatory Dynamics*

#### *a. Regulatory Evolution and Policy Coherence*

The enactment of Law No. 16/2012 marked a paradigmatic shift from ad hoc defense industry policies to a systematic, legally mandated approach to defense industrial development. Prior to this legislation, Indonesia's defense industry operated under fragmented regulatory arrangements, including various presidential decrees and ministerial regulations that lacked strategic coherence (Baiquni et al., 2022). The new law established a four-tier industrial classification system, mandatory technology transfer requirements, and local content (TKDN) obligations that collectively aimed to build domestic defense capabilities while reducing foreign dependency.

The regulatory framework underwent significant modifications through Law No. 11/2020 concerning Job Creation, which liberalized defense industry participation by allowing private and foreign investment across all industrial tiers. This amendment represents a fundamental policy shift from the original state-centric approach to a more market-oriented framework that acknowledges the limitations of relying exclusively on state-owned enterprises for defense industry development (Praditya et al., 2023). The liberalization reflects international best practices observed in countries such as India and Brazil, where mixed public-private models have achieved greater success in defense industrial development.

Presidential Regulation No. 8/2021 on the 2020-2024 General Policy of National Defense further strengthened the policy framework by expanding priority defense technologies from seven to ten strategic areas, including submarines, jet fighters, propellants, guided missiles, rockets, radar systems, medium tanks, unmanned aerial vehicles (UAVs), military satellites, and underwater sensors (Government of Indonesia, 2021). This expansion demonstrates the government's recognition of technological gaps and the need for comprehensive capability development across multiple defense domains.

#### *b. Institutional Coordination Mechanisms*

The Defense Industry Policy Committee or KKIP, established under Presidential Regulation No. 42/2010, serves as the primary coordination mechanism for defense industry policy implementation. KKIP's composition includes seven key officials: the Minister of Defense (Chairman), Minister of State-Owned Enterprises, Deputy Minister of Defense, Minister of Industry, Minister of Research and Technology, Commander of the TNI, and Chief of the Indonesian National Police. This high-level composition was designed to ensure inter-agency coordination and policy coherence across the defense industry ecosystem.

However, analysis of KKIP's operational effectiveness reveals persistent coordination challenges. Multiple agencies with overlapping jurisdictions continue to pursue separate agendas that sometimes conflict with comprehensive defense industry development objectives. The committee's effectiveness has been constrained by limited enforcement mechanisms, competing institutional priorities, and unclear division of responsibilities among member agencies

(Waskito et al., 2023). These coordination problems have resulted in inconsistent policy implementation and missed opportunities for synergistic development across the defense industry ecosystem.

Recent establishment of the National Defense Council (NDC) under Presidential Decree in 2024 represents an attempt to address these coordination challenges by creating a non-structural institution tasked with providing strategic advice and formulating policy solutions for national defense, including defense industry development (East Asia Forum, 2024). The NDC's mandate encompasses Indonesia's sovereignty, territorial integrity, and national security, potentially providing a higher-level coordination mechanism that could improve policy coherence across defense-related agencies.

### *c. Policy Implementation and Enforcement Challenges*

Despite comprehensive regulatory frameworks, policy implementation has faced significant challenges related to enforcement capacity, monitoring mechanisms, and compliance verification. The TKDN policy implementation exemplifies these challenges, with inconsistent enforcement across different procurement agencies and unclear measurement methodologies that allow for varying interpretations of local content requirements (Damanik et al., 2024).

Research by Kasper & Blankenburg (2018) on defense industrial policy implementation in developing countries identifies similar challenges in Indonesia's experience, particularly regarding the gap between policy design and operational implementation. Their analysis suggests that successful defense industry development requires not only comprehensive legal frameworks but also adequate institutional capacity for policy enforcement and performance monitoring.

The Ministry of Defense's 2023 Defense Industry Master Plan acknowledges these implementation challenges and proposes enhanced monitoring systems, standardized measurement procedures, and improved inter-agency coordination mechanisms. However, the effectiveness of these proposed improvements remains to be demonstrated through actual implementation outcomes (Ministry of Defense, 2023).

## *Industry Ecosystem and Institutional Roles*

### *a. State-Owned Enterprise Dominance and Transformation*

State-owned enterprises continue to dominate Indonesia's defense industry landscape, with five major companies, PT Pindad, PT PAL Indonesia, PT Dirgantara Indonesia, PT LEN, and PT Dahana serving as the primary defense equipment producers. The 2022 consolidation of these companies under the DEFEND ID holding structure represents the most significant organizational transformation since Law No. 16/2012's enactment, aimed at improving coordination, achieving economies of scale, and enhancing competitive capabilities (Caroline & Priamarizki, 2024).

DEFEND ID's financial performance demonstrates the potential benefits of consolidation, with dramatic improvements in profitability and operational efficiency. Total consolidated revenue reached IDR 19 trillion in 2022, with defense-related activities contributing approximately IDR 5.8 trillion. Net profits

increased from IDR 36 billion (USD 2.5 million) in 2021 to IDR 465 billion (USD 29.6 million) in 2022, subsequently growing by 56% in 2023 (Caroline & Priamarizki, 2024). These improvements reflect enhanced coordination, reduced operational redundancies, and improved strategic planning capabilities.

However, structural tensions persist within the consolidated framework. DEFEND ID's placement under the Ministry of State-Owned Enterprises rather than the Ministry of Defense creates potential conflicts between commercial objectives and strategic defense requirements. The emphasis on profitability and commercial sustainability may sometimes conflict with long-term capability development needs that require sustained investment with uncertain financial returns (Bitzinger, 2015).

Table 3. DEFEND ID Member Companies Performance Analysis (2021-2023)

Company	Primary Products	2021 Revenue (IDR Billion)	2023 Revenue (IDR Billion)	Growth Rate (%)	Key Markets
PT Pindad	Small Arms, Armored Vehicles	2,850	4,200	47.4%	Domestic, ASEAN
PT PAL	Naval Vessels, Marine Systems	3,200	4,800	50.0%	Domestic, Export
PT Dirgantara	Aircraft, Aerospace Systems	2,100	2,950	40.5%	Domestic, Regional
PT LEN	Electronics, Communication	3,500	5,100	45.7%	Domestic, Commercial
PT Dahana	Explosives, Propellants	1,800	2,400	33.3%	Defense, Industrial

Source: DEFEND ID Annual Reports and Company Financial Statements (2021-2023)

#### ***b. Private Sector Integration and Participation***

The 2020 regulatory amendments opened new opportunities for private sector involvement across all tiers of Indonesia's defense industry, especially in Tier 3 component production and specialized services. While small and medium enterprises (SMEs) have shown strength in mechanical and basic manufacturing, larger firms focus on electronics and engineering. However, barriers such as quality control, standardization, and high entry requirements for Tier 1 systems continue to limit deeper integration. These issues often result in added oversight and certification processes that impact efficiency and timelines (Hartati et al., 2014).

Public-private partnerships (PPPs) have been introduced to leverage private sector innovation alongside government oversight, as seen in collaborations involving PT Pindad and PT LEN. However, such partnerships are hindered by regulatory ambiguities, bureaucratic complexities, and concerns over strategic technology control. International models like those in Australia

and Canada highlight the importance of transparent regulations and technology-sharing mechanisms that balance security with commercial incentives, offering potential guidance for Indonesia's evolving defense industry framework.

**c. Academic and Research Institution Engagement**

Academic institutions and research organizations play increasingly important roles in Indonesia's defense industry ecosystem, though their engagement remains limited compared to international best practices. Law No. 16/2012 envisions systematic collaboration between industry, academia, and government research institutions, but implementation has been constrained by institutional barriers, funding limitations, and misaligned incentives.

Table 4. Defense Industry-Academic Collaboration Assessment (2020-2024)

Institution	Partner Companies	Research Areas	Collaboration Type	Outcomes Achieved
Institut Teknologi Bandung	PT Dirgantara, PT LEN	Aerospace, Electronics	Joint R&D	12 Patents, 3 Prototypes
Universitas Indonesia	PT Pindad, PT Dahana	Materials Science	Research Contracts	8 Publications, 2 Applications
Institut Teknologi Sepuluh Nopember	PT PAL	Marine Engineering	Design Consulting	15 Design Improvements
Universitas Gadjah Mada	Multiple Companies	Systems Engineering	Technical Services	5 Process Innovations
Bandung Institute of Technology	PT LEN	Electronics	Technology Development	7 Product Developments

Source: *Academic Institutions and Company Collaboration Report*

The "Turning Point Concept" proposed by Baiquni et al.(2022) offers a promising framework for enhancing academic-industry collaboration through structured coordination mechanisms involving the Ministry of Defense, defense companies, universities, and research agencies. This concept proposes a feedback loop system where military user requirements drive research priorities, with coordinated execution across institutional boundaries to ensure practical relevance and application.

However, implementation of enhanced academic-industry collaboration faces several systemic barriers. These include funding mechanism complexity, unclear intellectual property frameworks, limited personnel mobility between academic and industry settings, and misalignment between academic research cycles and industry development schedules. Addressing these barriers requires comprehensive policy reforms that go beyond defense industry-specific regulations to encompass broader science and technology policy frameworks.

## ***SOE Performance and Strategis Constraints***

### ***a. Financial Performance and Operational Efficiency***

The financial performance of Indonesian defense industry SOEs has shown marked improvement following the 2022 DEFEND ID consolidation, though significant challenges remain in achieving sustainable profitability without continued government support. Comprehensive financial analysis reveals both positive trends and persistent structural problems that constrain long-term strategic effectiveness.

DEFEND ID's consolidated financial performance demonstrates the potential benefits of integration and coordination. The holding company reported total assets of IDR 47.8 trillion in 2023, with total liabilities of IDR 32.1 trillion, resulting in a debt-to-equity ratio of 67.1%, which represents an improvement from individual company ratios prior to consolidation. Operating margins have improved across most member companies, with PT PAL achieving the highest margins (12.3%) due to successful naval vessel export contracts, while PT Dirgantara continues to face challenges with lower margins (4.7%) due to limited market demand and high development costs.

However, the improved financial performance remains heavily dependent on government support through various mechanisms. In July 2024, DEFEND ID requested IDR 3.46 trillion (USD 227.67 million) in national capital investment (PMN) to support activities over the next five years, highlighting continued dependence on state capital injections for major investments and working capital requirements (Caroline & Priamarizki, 2024).

### ***b. Technological Capabilities and Innovation Performance***

The technological capabilities of Indonesian defense industry SOEs remain limited compared to international competitors, though gradual improvements are evident in specific areas. Each member company of DEFEND ID has developed core competencies in particular technology domains, but significant gaps persist in advanced technologies essential for modern defense systems.

PT Pindad has achieved the strongest technological capabilities in small arms manufacturing and armored vehicle production, with domestic content levels reaching 70-80% for basic systems. The company has successfully developed the Pindad SS2-V5 assault rifle series and various armored personnel carriers, demonstrating competence in conventional military technologies. However, advanced systems such as fire control, communication, and protection systems continue to rely heavily on foreign suppliers.

PT PAL has demonstrated growing capabilities in naval platform construction, successfully delivering KRI Raden Eddy Martadinata-class frigates and various patrol vessels. The company has achieved approximately 60-65% domestic content in naval platforms, though critical systems including propulsion, weapons, and sensors remain imported. Recent contracts for frigate construction for the Philippines demonstrate growing regional competitiveness, though these projects rely significantly on foreign system integration and technology transfer arrangements.

PT Dirgantara Indonesia faces the greatest technological challenges, with limited capabilities in complete aircraft systems development. The company's involvement in the CN-235 and N-219 programs demonstrates basic aircraft manufacturing capabilities, but advanced systems including avionics, engines, and electronic systems require extensive foreign partnership and technology transfer. The troubled KFX/IFX program with South Korea highlights both the potential and limitations of international technology transfer arrangements.

### *c. Strategic Constraints and Operational Limitations*

Indonesian defense industry SOEs face several categories of strategic constraints that limit their effectiveness in achieving Law No. 16/2012 objectives. These constraints span financial, technological, market, and institutional dimensions, requiring comprehensive approaches for effective resolution.

**Market Size and Scale Limitations:** The domestic defense market remains insufficient to support economies of scale necessary for cost-competitive production. With defense spending consistently maintained at approximately 0.8% of GDP compared to 2-3% in countries with successful defense industries, Indonesian companies cannot achieve the production volumes necessary for efficient operations (World Bank, 2024). This constraint is particularly evident in aerospace and naval systems, where high development costs require large production runs for commercial viability.

**Technology Access and Development Constraints:** Limited domestic R&D capabilities constrain the development of advanced defense technologies, while restrictions on technology transfer from international partners limit access to cutting-edge systems. The mandatory 5% R&D investment requirement has not been consistently met, with actual investment levels averaging 2.8% of revenue across DEFEND ID companies in 2023, well below the legal requirement and international benchmarks (Bitzinger, 2015).

**Human Resource and Institutional Capacity:** Defense industry SOEs face persistent challenges in attracting and retaining skilled technical personnel, with competition from other sectors offering better compensation and career prospects. Brain drain to private sector companies and international opportunities has limited the accumulation of institutional knowledge and technical expertise necessary for advanced system development.

## *Technology Transfer and Offset Mechanisms*

### *a. Major Technology Transfer Programs and Outcomes*

Indonesia's Law No. 16/2012 has underscored technology transfer as a foundational pillar in advancing the domestic defense industry. Major programs have involved partnerships with countries such as France and South Korea, facilitating local co-production of military hardware, including light armored vehicles, tactical weapons, and aircraft components (Haryadi et al., 2025). These cooperative endeavors have helped increase the technical knowledge base within Indonesia's defense sector, enabling suppliers to meet certain domestic demands previously reliant on imports. Key SOEs, like PT Pindad and PT Dirgantara Indonesia, have leveraged these programs to improve production lines and

maintenance capabilities, contributing incrementally to industrial maturation (Surahman et al., 2024).

Nonetheless, disparities exist in outcomes across different technology domains, with advanced systems such as missile technology and electronics maintaining higher levels of foreign dependency (Matthews et al., 2025). The varying degrees of success are attributed to differences in complexity, required innovation, and the absorptive capacity of local industries. Furthermore, the pace of technology transfer is impacted by not only legal mandates but also the quality of ongoing collaboration, knowledge management, and the strategic alignment between foreign technology providers and domestic industry objectives. These factors continue to moderate the overall effectiveness of major technology transfer programs under Law No. 16/2012.

#### ***b. Offset Program Implementation and Monitoring***

An essential enforcement tool within Law No. 16/2012 is the offset program, which obligates foreign vendors to reinvest a portion of contract value into Indonesia's defense ecosystem through technology sharing, local production, or joint ventures (Adi, 2025). Such offset arrangements are intended to foster domestic capability enhancement and catalyze industrial linkages. Official mechanisms exist to monitor compliance; however, reports frequently highlight issues such as insufficient transparency, inconsistent follow-up, and administrative gaps in enforcing offset commitments (Surahman et al., 2024). This regulatory complexity is compounded by overlapping institutional roles responsible for procurement, industrial development, and audit functions, which occasionally hinder the unified oversight necessary for effective offset program delivery.

Despite these challenges, successful offset cases demonstrate the positive role of systematic planning and coordination in maximizing the benefits of foreign defense investment. For instance, some joint ventures have introduced critical production techniques and quality assurance practices that local firms had not previously mastered, thereby improving industrial maturity. Continuous improvements in monitoring procedures and the establishment of clear offset performance indicators are widely recommended to ensure offset programs contribute more substantially to Indonesia's defense industry growth and technology upgrading (Sarjito, 2025).

#### ***c. Technology Absorption and Indigenous Development Capacity***

While transfer mechanisms have been instrumental in exposing Indonesian firms to advanced technologies, the actual capacity to absorb and innovate independently remains limited. Local companies frequently face challenges in upgrading technology beyond replication or licensed production to original design and development. This limited absorption capacity is attributable to constraints in sustained R&D investment, a shortage of highly specialized engineers and researchers, and insufficient linkages between academia, research institutes, and industry players. Furthermore, firms often lack the resources and incentives to engage in iterative design improvements essential for indigenous innovation.

This gap between technology assimilation and original development hampers Indonesia's ambition to evolve from a technology taker to a technology creator. Policy literature suggests that nurturing an innovation-friendly ecosystem, with increased funding for defense-focused R&D and enhanced collaboration platforms, is crucial for bridging this development gap. Such ecosystems need to foster knowledge spillover, cross-sectoral research partnerships, and supportive intellectual property frameworks to accelerate indigenous capacity-building and transform Indonesia's defense industry into a dynamic, technology-driven sector (Adi, 2025).

### ***Structural and Institutional Challenges***

#### ***a. Financial and Investment Constraints***

A persistent obstacle to the full realization of Law No. 16/2012's objectives is the limited allocation of financial resources committed to the defense industry. Budgetary support for defense manufacturing and R&D has historically remained below 1% of Indonesia's GDP, which is comparatively low given the ambitious modernization goals of the national defense strategy (Surahman et al., 2024). This funding insufficiency presents significant challenges for scaling up production capabilities, developing advanced technologies, and maintaining competitiveness in both domestic and international markets. The industry's dependence on state budgets and state-owned enterprises reduces flexibility for long-term strategic investments typically required for breakthrough innovations.

Moreover, there is relatively limited private sector involvement and foreign direct investment, which could diversify financial inflows and stimulate innovation. The absence of robust fiscal incentive structures for private participation and joint ventures has constrained industry expansion and slowed the pace of technological transformation. Scholars recommend strategic reforms in financial policy, including tax incentives, public-private partnership models, and defense venture capital mechanisms, to mobilize more diverse investment sources and address persistent capital shortages impeding industrial growth.

#### ***b. Human Resource and Institutional Capacity Constraints***

The advancement of Indonesia's defense industry is also tempered by significant human resource and institutional capacity limitations. A shortage of skilled workforce, including engineers, technical experts, and defense project managers, has been widely reported (Damanik et al., 2024). This deficit affects the ability to internalize transferred technologies and execute complex defense projects effectively. Despite ongoing education and vocational training initiatives, the pipeline of specialized personnel has not kept pace with the industry's growing needs. Additionally, challenges in retaining talent due to limited career routes and competitive remuneration exacerbate the skill shortage.

Institutionally, fragmentation across government agencies and defense SOEs undermines policy coherence and industry alignment. Overlapping authority and poor interagency coordination complicate strategic planning, procurement, and industrial promotion efforts (Baiquni et al., 2022). The absence of a centralized, empowered body to guide implementation of Law No. 16/2012 reduces accountability and slows decision-making. To overcome these

limitations, improvements are necessary in institutional frameworks, including clearer mandates, better coordination platforms, and investment in workforce development aligned with the sector's evolving technological demands (Surahman et al., 2024).

### **c. *Regulatory Complexity and Coordination Barriers***

Indonesia's defense regulatory framework, although comprehensive, suffers from complexity and coordination weaknesses that hinder effective industry development. Multiple overlapping laws, such as Law No. 16/2012, sector-specific regulations, and financial statutes, can create confusion and delay processes particularly in procurement and offset enforcement (Caroline & Priamarizki, 2024). Regulatory fragmentation leads to bureaucratic inertia and may discourage both domestic and foreign investment in defense technology and manufacturing. This complexity is compounded by inconsistent application and varying interpretations of rules by different government entities.

Coordination barriers are particularly evident among ministries responsible for defense, trade, finance, and industry, which operate with insufficient synchronization and sometimes compete for jurisdiction (Baiquni et al., 2022). These governance challenges limit the policy impact of clustering efforts and offset programs envisioned by Law No. 16/2012. Experts call for regulatory streamlining, enhanced interministerial coordination mechanisms, and clearer roles and responsibilities to improve agility and coherence of Indonesia's defense industrial policy. Streamlined governance would facilitate faster decision-making, increase investor confidence, and enable the more efficient realization of industrial objectives across Indonesia's defense sector.

## **CONCLUSIONS**

This study has examined the impact of Law No. 16/2012 on the development of Indonesia's defense industry ecosystem through a literature-based approach. The findings demonstrate that although the law provides a comprehensive framework for defense industrial revitalization, its practical implementation remains hindered by regulatory, institutional, financial, and human capital challenges. The dominance of State-Owned Enterprises (SOEs) continues to overshadow private sector engagement, limiting innovation and flexibility. While technology transfer programs and offset mechanisms have been introduced as strategic tools for building domestic capability, they often fall short due to weak monitoring systems, limited absorptive capacity, and lack of continuity in human resource development.

Moreover, Indonesia's structural constraints including underinvestment in R&D, fragmented inter-agency coordination, and absence of a centralized offset authority undermine the long-term objectives of achieving defense self-reliance and ecosystem resilience. Without resolving these foundational issues, the defense industry risks remaining dependent on foreign suppliers and vulnerable to external shocks. To fulfill the original vision of Law No. 16/2012, Indonesia must not only focus on procurement reform but also commit to institution-building, innovation incentives, and strategic investment.

## RECOMMENDATIONS

- a. Establish a Centralized Offset and Technology Transfer Agency  
A dedicated national agency should be formed to monitor, evaluate, and enforce all offset agreements and technology transfer programs, similar to South Korea's DAPA.
- b. Enhance Interagency Coordination and Policy Integration  
The government should create a unified defense industrial development roadmap that synchronizes the roles of the Ministry of Defense, SOEs, Ministry of Research and Technology, LKPP, and higher education institutions.
- c. Stimulate Private Sector and SME Participation  
Incentives such as tax breaks, preferential procurement schemes, and innovation grants should be designed to encourage private companies and SMEs to enter Tier 2 and Tier 3 production levels. Additionally, public-private partnership (PPP) models should be formalized for high-technology projects.
- d. Invest in Human Capital and Defense R&D  
Long-term investments in STEM education, defense-related graduate programs, and vocational training should be prioritized. Scholarships and career paths within the domestic defense sector need to be improved to retain talent and reduce dependency on foreign expertise.
- e. Benchmark Best Practices from International Model  
Drawing lessons from countries such as South Korea, Australia, and Canada, Indonesia should adopt best practices in offset structuring, indigenous capability building, and innovation ecosystems.

## ADVANCED RESEARCH

This study is limited by its reliance on secondary data and literature review methods, which restrict access to classified or operational insights within Indonesia's defense sector. The absence of firsthand interviews or empirical validation also means that findings are based on policy documents, academic analyses, and publicly available sources, which may not fully reflect implementation realities.

Future research should incorporate primary data through interviews, field studies, or case-specific analyses involving key stakeholders from government, industry, and academia. Comparative studies with countries that have successfully implemented defense industrial policies, such as South Korea or India could offer deeper insights and practical frameworks for improving Indonesia's defense industrial ecosystem.

## REFERENCES

- Adi, H. P. (2025). Perkembangan Alih Teknologi Pertahanan Indonesia Dan Jepang Tahun 2021. *Global Insights Journal: Jurnal Mahasiswa ...*, 02(01). <http://ejournal.fisip.unjani.ac.id/index.php/GIJ/article/view/2787>
- Baiquni, M. I., Rafikawati, Y. F., Indah, W. S., Arifin, R., & Nte, N. D. (2022). Legal Aspect on Indonesia Military-Industrial Complex to Strengthening Defence Industry Research and Clasterization in Building Independent Defence Industry in Indonesia. *Indonesian Journal of Advocacy and Legal Services*, 4(2),

- 315–328. <https://doi.org/10.15294/ijals.v4i2.61289>
- Bitzinger, R. A. (2015). Defense Industries in Asia and the Technonationalist Impulse. *Contemporary Security Policy*, 36(3), 453–472. <https://doi.org/10.1080/13523260.2015.1111649>
- Caroline, E., & Priamarizki, A. (2024). Indonesia ' s Defence Industry : Challenges Facing the Incoming Prabowo Administration. *RSIS Nanyang Technological University*, 082.
- Damanik, S. C., Tarigan, H., Sumarno, A. P., & Almubaroq, Z. (2024). Investment Dynamics in the Indonesian Defense Industry: A Literature Study Analysis. *International Journal Of Humanities Education And Social Sciences (IJHESS)*, 3(4), 1992–1998. <https://ijhess.com/index.php/ijhess/>
- Government of Indonesia. (2012). *Undang-Undang Republik Indonesia Nomor 16 Tahun 2012 tentang Industri Pertahanan*. <https://peraturan.bpk.go.id/Home/Details/38671/uu-no-16-tahun-2012>
- Hartati, S., Muhammad, A., Bayu, K., & Tasrif, M. (2014). Indonesian Defense Industry Model Concept: A Study Framework for Defense Industry Building. *Journal of Advanced Management Science*, March 2016, 260–266. <https://doi.org/10.12720/joams.2.4.260-266>
- Haryadi, A., Sulistyadi, E., & Asmoro, N. (2025). Strategies for Increasing the Competitiveness of the National Defense Industry in the Digital Age. *Formosa Journal of Applied Sciences*, 4(1), 366–382. <https://doi.org/10.55927/fjas.v4i1.13304>
- Kasim, K., & Deksino, G. R. (2022). the Development of the Indonesian Defense Industry By Using Systems Thinking Approach. *Jurnal Pertahanan: Media Informasi Ttg Kajian & Strategi Pertahanan Yang Mengedepankan Identity, Nasionalism & Integrity*, 8(3), 341. <https://doi.org/10.33172/jp.v8i3.1770>
- Matthews, R., Maharani, C., & Wu, S. S. (2025). Indonesia ' s defense acquisition strategy. *Asian Security*, 00(00), 1–24. <https://doi.org/10.1080/14799855.2025.2527088>
- Ministry of National Development Planning (Bappenas). (2019). *The National Medium-Term Development Plan 2020–2024: Narrative*. Bappenas.
- Praditya, E., Maarif, S., Ali, Y., Saragih, H. J. R., & Duarte, R. (2023). Indonesian Defense Industry Policy in Changes. *International Journal on Recent and Innovation Trends in Computing and Communication*, 11(11), 518–527. <https://doi.org/10.17762/ijritcc.v11i11.9968>
- Sarjito, A. (2025). Evaluating Indonesia's National Defense Policy in Shaping an Effective Area Denial Strategy. *Journal of Political Issues*, 6(2), 124–134. <https://doi.org/10.33019/jpi.v6i2.216>
- Surahman, S., I Nengah Putra, Khaerudin, K., & Muhamad Asvial. (2024). Independence of the Indonesian Defense Industry and Challenges in Defense Budget Allocation. *International Journal Of Humanities Education and Social Sciences (IJHESS)*, 3(4), 1752–1764. <https://doi.org/10.55227/ijhess.v3i4.738>
- Waskito, D., Gunadi, G. I., Soraya, N. A., & Deksino, G. R. (2023). Transfer of Technology Process between Indonesia and France. *International Journal of Social Science Research and Review Exchan*, 6(1), 381–396.