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# Cluster Model Study of the Indonesian Defense Industry towards Encouraging Industry Independence

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## Abstract

The purpose of this research is to find out how the defense industry and stakeholders are involved in developing defense industry clusters via comparative qualitative research methods. The results of the research show that the defense industry sector has 4 cluster stages. In conclusion, in the medium term, increasing industrial competitiveness is carried out by building and developing priority industry clusters while in the long run, it is more focused on integrating cluster approaches with efforts to manage demand (management demand) and build core competencies in each cluster.

**Keywords:** Cluster, Industry, Defense, Industry, Model.

# Estudio modelo de clúster de la industria de defensa de Indonesia para alentar la independencia de la industria

## Resumen

El propósito de esta investigación es descubrir cómo la industria de la defensa y las partes interesadas están involucradas en el desarrollo de agrupaciones de la industria de la defensa a través de métodos comparativos de investigación cualitativa. Los resultados de la investigación muestran que el sector de la industria de defensa tiene 4 etapas de agrupación. En conclusión, en el mediano plazo, el aumento de la competitividad industrial se lleva a cabo mediante la construcción y el desarrollo de clústeres industriales prioritarios, mientras que a largo plazo, se centra más en integrar los enfoques de clúster con los esfuerzos para gestionar la demanda (gestión de la demanda) y construir competencias centrales en cada uno racimo.

**Palabras clave:** Cluster, Industria, Defensa, Industria, Modelo.

## 1. INTRODUCTION

Independence is not only one goal and aspiration of nations throughout the world, but more as the needs of each nation, like the Indonesian nation. The independence of the field of national defense is essential for the Indonesian people in maintaining the State and acting as an effective instrument to improve the bargaining position in relations between countries. This condition needs to be supported by an independent defense industry. For this reason, existing industries are required to have special abilities and can guarantee the availability of products needed.

Industrial independence must have the ability to spin off in product diversification that has commercial value and benefits by using defense technology. As with a profit-oriented industry, the utilization of industrial resources is not only used for the benefit of the defense as its primary function. However, when demand and needs reduced, given that the market for defense products is relatively fixed, existing capabilities are utilized for commercial production that is needed by the community and can provide adequate benefits. These conditions require a high level of production flexibility and high management and business capabilities, as well as not owned by another company. This condition applied in the defense industries of developed countries such as the United States, as an example of the strategies implemented namely Blue Ocean Strategy, how to Create Uncontested Market Space and the Irrelevant Make the Competition.

Another characteristic of the independence of the defense industry is the existence of a secure network in the concept of inter-industry partnership relations. To improve competitiveness, while reducing the level of dependence from abroad, we need a system of a grouping of related industries intensively and an agglomeration of firms that establish partnerships, both as supporting industries and industry-related.

That self-reliance needs to be also supported by the quality of human resources which are creative, innovative and mastering technology. Industrial clusters are group activities that consist of a core industry, related industries, supporting industries and activities of the other economic and supporting industries. This approach can improve

competitiveness and create national industrial strength in the form of interdependence, interrelationship, and mutual support between upstream industry, downstream industry, supporting industries and related industries, which mean that it can also reduce the dependence of the manufacturing industry on imports of capital goods, intermediate inputs, raw materials, components, and spare parts.

The growth of the defense industry supported by the development of industrial clusters that can be used to develop a broad industry and focus on the types of products that have the opportunity to have high international competitiveness in the domestic market and global market. The cluster development will give multiplier effects to related industries. Thus it is clear that all supporting industries gave their support to the core industries and will encourage defense industry independence.

## **2. METHODOLOGY**

The development of all fields is a must. Defense Industry Development is an integral part of the National Development Strategy of the Republic of Indonesia. Threats are always lurking both at home and abroad and in various formats. Defense preparedness is a constant that must be enforced regardless of the risks. For that software or hardware must always be available for use in counteracting or destroying severe threats.

Some problems can arise in the organization of Defense which can hinder or reduce the function of Defense, such as the Embargo problem which has made it difficult or even functioned for the Republic of Indonesia Defense several times. Completion of the short term and as practical as shifting Country is also not a powerful answer to solve this problem. A new paradigm is needed to support the capability and function of defense in a country, namely to create an atmosphere to raise the defense industry as the main supplier of weapons and defense equipment in the armed forces.

Efforts to develop the defense industry must be built based on the principle that we do not prepare ourselves to develop defenses that face war or other countries. Development of the defense industry certainly concerning the interests of all stakeholders involving various user elements, producer, designers, testers, researchers are competent and with a mature business plan, known as the concept of the Three Pillars Actors Defense Industry.

### **3. RESULT AND DISCUSSION**

There is a concept of an integrated and concentrated partnership relationship in the development of the defense industry, between universities and the Research and Development community that has the potential to develop defense science from within. In this case, the military as a user not only as an initiative but also participated in the design development to produce a prototype. Thus, the TNI does not

only function as a project provider, but also participates in developing products as needed; in this case, ergonomics can be applied and embedded in each design.

One concept that became a discourse and developed during the Round Table Discussion on Defense Industry Development on January 26, 2005, namely the need to establish a Defense Industry Policy Committee whose members consist of elements of Three Party Network. Related to research activities with elements of research institutes and universities there also a role in the development of technology that is recognizing as a national capability which then gets attention on strategic policies and industrial policies. Triple Helix Relationship maintains the continuity of the technological innovation process.

Clusters are geographic concentrations of industries related to knowledge, skills, inputs, demand, and other linkages. A growing body of empirical literature has been shown the positive impact of clusters of regional and industry performance, including job creation, patenting, and new business formation (DELGADO, PORTER & STERN, 2014). Marshall highlighted three distinct drivers of agglomeration: input-output linkages, labor market pooling, and knowledge spillovers, which associated with costs or advantages to firms' productivity. Clusters may be developed based on industrial similarity or interdependency. According to Jacobs and De Man, there are three types of clusters: Regionally concentrated industries, sectors or groups of sectors, or production chains.

Defense systems are generally complex, large-scale, and software-intensive systems. Normally, the defense contract project won by the main contractor. This main contractor has many subcontractors to develop various parts of the system. The play contractor may also get services for design and testing. Defense systems normally develop for governments and stakeholders' involvement is especially challenging in government-contract software projects.

Some defense models that can be adopted by the Indonesian defense system include autarky models, which is an ideal model for getting defense independence. This model can only be achieved by countries that have the status or ambition to become a significant power of the world (high power) which is supported by a significant military posture. At present, there are only seven countries that are predicted to be able to implement autarky models in the 21st century, namely: The United States, Russia, China, India, Brazil, (consortium) of Western Europe, and Indonesia. To be able to apply the model, four strategies must be implemented in Indonesia: First, formulate a long-term defense strategic plan. This strategic plan must be able to describe three central plans, namely: (1) The evolution of Indonesian military power is a significant force in East Asia. This evolution describes not only a minimum 2024 Defense Force fulfillment target, but also a defense posture development plan up to 2050; (2) Blueprint for Defense Industry Revitalization containing General Defense Industry Development Policy,



Defense Industry 2020 Revitalization Strategy, and the 2050 Defense Industry Independence Program; and (3) Alusista 2024 Procurement Plan which is sort in the form of the 2012-2014 Alutsista Procurement Plan, 2014-2019 and 2019-2024. Second, forming a long-term budget political commitment to ensure the sustainability of the defense industry development program. This budgetary, political commitment is carried out by setting a target for defense budget allocation to GDP which is gradually raised from 1% of GDP in 2014 to 2.5% of GDP in 2024 and must also be accompanied by the formulation of medium-term procurement contracts that megaproject from the government to defense industry. This mega project is directed to build conventional weapons systems such as fighter planes, surface warships, submarines, tanks, assault helicopters and missiles in large numbers to provide certainty and continuity of the production process for the national defense industry. The nominal value of this procurement contract must also gradually increase from 10% of the value of all arms procurement in 2014 to a minimum of 30% in 2024 (DEMIR, 2005).

Third, consolidate the national defense industry by establishing two strategic consortia, namely the national aviation industry consortium (national aerospace industry) and national maritime and defense industry consortium. The two consortiums must form a national defense equipment production chain involving other national industries, including medium-small industries.

Fourth, the pioneering defense industry alliances at the regional and global levels which increase the possibility for Indonesia to

quickly adopt the latest military technology into the defense equipment procurement process. The technology adoption process is a method for implementing niche-production models that can be used as transitional stages to achieve Indonesian defense independence. This alliance was also formed to increase access to the arms market which allows the national defense industry to become part of the global production chain. This method relies on the application of a global supply chain model that can also use as a transitional stage for the development of the national defense industry (INESTIANTY, 2008).

The four strategies are formulated to ensure a strong political commitment to shaping the independence of the Indonesian defense industry. If political commitment can be realized, the development of the national defense industry can be made to initiate a defense transformation that makes the ability to adopt military technology as a determinant to build a modern defense force in the XXI century.

Indonesia is a large country consisting of thousands of islands. Threats to the integrity of the Republic of Indonesia can come from within and outside the country. However, the territorial extent that must be guarded by the TNI is not accompanied by an increase in the central weaponry system (defense equipment). The challenge of the TNI to maintain the integrity of the Republic of Indonesia is higher because the average weaponry that is own is old, aged 25 to 40 years. The details of the readiness of the three dimensions, namely the Army, Air Force, and Navy are different. The readiness level of the Army is 35 percent, TNI Air Force 30 percent,

and TNI Navy 30 percent (IRELAND, ROBERT, HOSKISSON & MICHAEL, 2011).

In general, the level of preparedness of land forces until the end of 2008 averaged 68.85 percent and divided into five categories. The first category covers 1,261 units of various types of combat vehicles with readiness levels of 63.36 percent, secondly cover 537,198 infantry weapons of various types with a readiness level of 72.86 percent. The third category cover 983 artillery weapons of various types with a readiness level of 74.97 percent, followed by 59,842 units of motorized vehicles of various types with readiness levels of 87.17 percent and lastly 61 aircraft units of various types with a level of readiness of 45.90 percent (ERENEL, DEMIR & CAYMAZ, 2015).

The level of readiness of the marine dimension strength reaches an average of 46.27 percent, which includes: 143 units of warships (KRI) with a level of readiness of 61.53 percent, 312 units of Navy Vessels (KAL) with a level of readiness of 24.35 percent, 410 units' Marine combat vehicles of various types with readiness levels of 38.29 percent, and 64 units of aircraft with a readiness level of 60.93 percent. The strength of the TNI AU defense equipment that is based on fighter aircraft, transport planes, helicopters and other types of aircraft, as well as average radar and missile readiness equipment currently reaches 78.93 percent, which includes: 233 aircraft units of various types with readiness 55.79 percent, 16 units of radar equipment with a readiness level of 81 percent, and 26 sets of short-range missiles with 100 percent readiness (ALEXANDRA, 2019).

To realize the broad potential defense industry required a robust industrial restructuring. Based on the characteristics of the defense industry products, including robust, reliable and accurate, the defense industry has a high technology content. Thus to encourage the creation of product specialization, it requires an industrial structure that is mutually supportive between one industry and another in a layered manner. This condition will reduce the level of dependence on the foreign component industry while creating a strong industrial structure and a competitive climate among industries. The defense industry can be the core of a cluster, or together with other defense industries form clusters or be part of one or several industrial clusters that produce commercial products. Determination of defense industry clusters can be applied according to the essential domains of defense, namely industrial clusters of mobility and mobility, attack and throwing power, command and control power and carrying capacity and supplies.

Indonesia has great potential (endowment), both natural resources and human resources so that it is capital for the nation to realize the desire to become a developed and stable country. For that, it is necessary to have the right priority in each stage of achievement, including:

1. Improve R & D activities and defense innovations so they can be spurring the level of competition among the defense industry.
2. Export promotion strategy; Defense industry players need to take advantage of opportunities to increase exports; Export expansion

to potential non-traditional regions, not only to traditional export destinations.

3. Clusters development and agglomeration; the result of domestic production has not been able to serve the needs of all regions in Indonesia. Therefore, it is necessary to develop clusters and agglomerations to utilize commercial industries that have been able to supply components in defense products (DEMIR, 2009).

Indonesia has succeeded in developing strategic industry clusters through national industrial transformation efforts initiated by Prof. BJ Habibie. Applying the concept of starting from the end and ends at the beginning in a quarter span century which is able to develop, among others, the aerospace industry, the maritime and shipping industry, defense industry, electronics and telecommunications industries, as well as an engine of growth footing heading stage innovation-based economy. It required stages of the transformation industry through formula micro-accelerated evolution unit, BJ Habibie formulate the stages of the transformation of the Indonesian industry in the opposite direction with a phase in the developed countries it will start from the phase assembly and marketing of the product and ends at the phase of basic research. Some of the concepts of industry transformation breakthroughs that need to be done are:

The first stage:

Establishment of production technology capabilities through the implementation of the Progressive Manufacturing Plan (PMP). This stage is an integrated policy to shape the manufacturing capability of a

product with technology obtained through a license, which gradually, this technology will be controlled completely. This phase also includes efforts to increase local content and master various aspects of organizational and QCD management (quality, cost, delivery) production, vendor networks and supporting industries, marketing, sales, and after-sales services, and various other aspects of international business. Examples of the first stage of technology products are CN-212, Caraka Jaya vessels, Iskandar Muda fertilizer plants, Semen Gresik factories, Fast Patrol Boat 57, FP Bromo trains, and Argo Gede and Pasopati telecommunications systems.

#### Second Stage:

The establishment of the ability to diffuse and integrate technology into the design and manufacturing of a new product that has a prospectus market. This stage focus on the mastery of the various aspects of product development and relationships feeds it over-complicated through production planning, market analysis, product lifecycle management/technology, Metrology, Standards, Testing and Quality (MTSQ), and the development of marketing network and after-sales. Establishment of alliances with technology resources as part of efforts to optimize the entire design, production, and marketing process. Domestic products produced at this stage are CN-235, Toyota Kijang cars, Palindo Jaya I ships, Pupuk Pusri 1-B factories, Garbarata, and Sosrobahu flyovers.

#### Third phase:

Establishment of innovation capabilities to integrate the most up-to-date technology, while developing new product designs and

manufacturing that are more advanced than existing products on the market. Prepared the ability to compete directly and openly in the global market, along with the establishment of confidence in the development and marketing of new products in the second stage. This stage will succeed if you pay attention to these four factors, that are: factor (1) follow and anticipate the progress of science and technology followed by factor (2) mobilize and manage the accumulation of functional skills that formed through various design, production, and marketing activities routinely and through research and development activities in within the company and outside the country.

Factor (3) developing various forms of relationships with a global network of science, research, and technology resources is another essential. Other understanding components of the mechanisms are the Push Technology and Market Pull complex in the process of innovation and its relation to business systems and competition as a whole. Examples of third-stage technology transfer products include the Gatot Kaca N-250 aircraft and Texmaco textile machinery. After going through the third stage, the development of the industry became very dependent on the development of the world of research, information, and repertoire of science and technology formed both inside and outside the country.

This fourth stage needs to develop substantially necessary research capabilities and is intended to create scientists who can act on the cutting edge of technological progress, where their presence is also significant to link themselves to global research networks. The relationship between the industry and the scientific and research

community has been initiated in the third stage and must also be expanding afterward.

The concept of BJ Habibie's industrial transformation led Indonesia, which in the 1990s was dubbed one of the Asian Tigers to have ten strategic industrial BUMNs that were developed and coordinated by the Strategic Industrial Management Agency, namely PT. DI (flight), PT. PAL (shipping), PT. LEN (electronics), PT. INKA (railways), PT. INTI (telecommunications), PT. Krakatau Steel (steel), PT. Pindad (weaponry), PT. Barata Indonesia (heavy equipment), PT. Boma Bisma Indra (industrial equipment) and PT. Dahana (explosives) (ANTHONY & ROBERT, 2010).

The industries involved in Indonesia's defense industry are divided into:

1. Supplier Industry
- 2, Core Industry
- 3, Buyer
4. Supporting Industry
5. Related Industry.



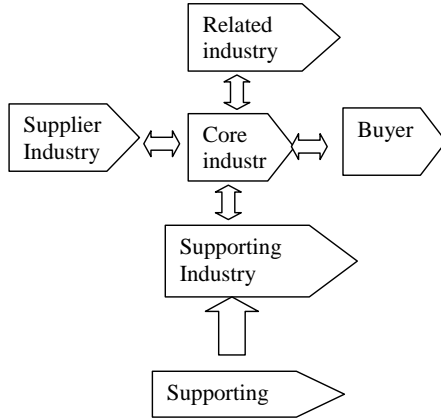


Fig 1: Cluster Industry Generic Models

To support defense groups, Indonesia has collaborated with its domestic business partners specifically for TNI maneuver units in the field, namely:

1. PT. Pindad (Persero): as a leading industry sector, including implementing design integrators, brake system work, steering systems, and weapons
2. PT. Krakatau Steel (Persero) Tbk: as a provider of steel material for raw materials 4 x 4 Rantis
3. PT. Autocar Industri Components: as a provider of powertrain/driveline, power pack (engine and transmission), electrical AC and engine, which, driver set/tool kit, body assembling painting work
4. PT. Yudistira Components: as the executor of the chassis and body components

5. Indonesian Manufacturing Petrodril: as the executor of suspension assay, hub reduction, transfer case, and propeller shaft

6. CV Indopulley Perkasa: as a provider of mounting engines and transmissions, rubber parts, seals, wheels and run-flat tires

7. PT. Gajah Tunggal Tbk: as a tire provider

8. PT. Pilarmas Kursindo Persada: as a provider of seat/chair compartments, glass and grill, body dashboards and accessories/ inside interior components.

In analyzing defense industry clusters, there are 3 (three) measurement dimensions, namely:

9. Linkage: Includes innovation, labor, and input. Linkage determines whether the value chain clusters, labor-based clusters, or innovation clusters will be formed.

10. Geography: That is concentrated in one area (localized) or non-localized.

11. Developing industries with cluster will provide significant benefits to economic growth. The cluster benefits: (a) Clusters can strengthen the local economy, (b). Clusters can facilitate industrial reorganization. Several defense industry companies and production capabilities in Indonesia are presented in Table 4.1 below.

Table 1: Defense Industry Companies and Production capabilities in  
Indonesia

no	defense industry	production capability	information
1	pt di	cn 235 n 212helli (super puma, bell, bo)	
2	pt pindad	weapon, munition, panser, weight	
3	pt pal	fpb 28, fpb 57, lpd, niaga ship s / d 50,000 dwt	construction of pkr plan 214 completed the prime unit
4	pt dahana	military and commercial explosives	
5	pt len	alkom ranpur, surveilliance, combat management system, solar power.	
6	pt inti	video surveilliance system, nex generation, video messaging system, digital tv system	
7	pt Krakatau steel	steel ksw 500 (bullet- resistant), hot / cold rolled coil, wire road	

no	defense industry	production capability	information
8	pt inka	passenger cars & goods	
9	pt bharata Indonesia	basketball bombs, sharp f- 16 bombs, & heavy equipment	
10	pt boma bisma indra	power plant equipment (paiton), cement plant equipment, sugar, ammonia	
11	pt dok perkapalan koja bahari	ship lct, lcu, repowering kri	
12	pt dok perkapalan surabaya	ship lct, lcu, repowering kri	
13	Indonesian ship industry	patrol boats, cargo ships, fishing vessels	

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Source: KKIP, 2012

Then in 2010, there was a development with PP No. 42 of 2010 concerning the committee of defense industry policy (KKIP), KKIP was officially established. A glimpse of the duties of the Defense Industry Policy Committee is:

- a. Formulate the national strategic policy in the defense industry;
- b. coordinate the implementation and control of national defense industry policies;

c.coordinate overseas cooperation in order to promote and develop the defense industry;

d. Perform monitoring and evaluating the implementation of defense industrial policy.

#### **4. CONCLUSION**

The purpose of this research is to find out how the defense industry and stakeholders are involved in developing defense industry clusters. The results of the research show that the defense industry sector has 4 cluster stages. Stage (1) is Phase of the formation of production technology capabilities through the implementation of the Progressive Manufacturing Plan, followed by stage (2) The establishment of the ability to diffuse and integrate technology into the design and manufacturing of new products that have a prospectus market. Stage (3) is the Establishment of innovation capabilities to integrate the latest technologies and develop designs and manufacturing new and more advanced products, and lastly, stage (4) is Development of substantial basic research. Based on the results of the study can be concluded as follows:

1. With the awakening model development of defense industry Indonesia based cluster is, then hope the implication is:

a.Needs products industry defense of Indonesia will be met by the domestic defense industry so that foreign dependence will become smaller.

b. The development of the defense industry that already exists and the growth of new industries and can contribute to the defense sector, so that new jobs will be created and can absorb labor, thus contributing to the efforts to overcome the problem of unemployment and poverty.

c. Strengthen linkages at all levels of the value chain (value chain) of the industry including the activities of supporting industries (supporting industries), related industries (related industries), industrial infrastructure providers, and other supporting services industry. This linkage developed as an effort to build industrial networks (networking) and improve competitiveness that drives innovation;

d. Increase added value along the value chain by building core competencies;

2. In the medium term, increasing industrial competitiveness is carried out by building and developing priority industry clusters while in the long run, it is more focused on integrating cluster approaches with efforts to manage demand (management demand) and build core competencies in each cluster. To achieve the goal needs to be supported by managing the network (management network) both for clusters in the country and with foreign companies. The government generally supports defense clusters with certain incentives such as tax reductions, cheaper rents, ease of access to funds and credits.

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