



## National Competitiveness of Indonesian Warship Industry: A Qualitative Study by Using Porter Diamond Model

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### ABSTRACT

The objective of this research is to find out the competitiveness of the Indonesian warship industry in the warship industry competition in ASEAN and East Asia. This research is a participant observation ethnographic research, the results of the research shows that the competitive advantage of the Indonesian warship industry is still not on the top level and left behind by the other countries. Warships produced by the Indonesian warship industry are almost entirely for local consumption, even though they are using by the Indonesian Navy not because their quality meets the qualifications set by warship user, but because of government's policy which obliges users to prioritize the use of the national produced warships. The outcomes should be used as input for the government and related stakeholders in determining policies to increase the competitive advantage of the warship industry in Indonesia. Based on the research, the Porter Diamond Model for the Indonesian Warship Industry can be proposed. Several recommendations were given to the government and related stakeholders to increase the competitive advantage of the Indonesian warship industry.

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### 1. Introduction.

Historical facts show that during the kingdom's era, the Majapahit and Sriwijaya kingdoms were two great maritime kingdoms and able to unite the Indonesian archipelago (Prmono & Changming, 2019). By having the capability to apply the right and up-to-date technology due to the era, the Majapahit and Sriwijaya became a superior maritime power in the ASEAN (Rosyidin, 2021). The predecessors of the Indonesian were aware that by having a great sea power fleet glory would be achieved (Bueger, 2015). During his early days of his reign, Indonesian President Joko Widodo invited all Indonesian to return Indonesia as a maritime country and make Indonesia as the world's maritime axis. To realize this idea, a strong maritime force is needed not only to support the idea but also to support other national interests.

Although in Indonesia there are various shipyards competent in producing patrol boats or warships, only PT PAL Indonesia (Indonesian Shipyard Company) capable to produce large warships and able to export Strategic Sealift Vessel (SSV) to the Philippines Navy and signed contracts for the procurement of Strategic Sealift Vessel (SSV) to the Philippines Navy and signed contracts for the procurement of Landing Platform Dock (LPD) with the Government of the Philippines and the Government of the United Arab Emirates (UAE). The level of dependency on foreign products is still high, such as on shipbuilding technology, weapons technology, sensors, ship engines, ship electronic systems, raw materials and human resources (Bachtar et al., 2021; Buana Ma'ruf, 2014).

### 2. Literature Review.

#### 2.1. Porter Diamond Model.

Diamond model is a term used to refer the determining factors as a system consisting of several determinants, interrelated and mutually reinforcing. The Diamond model assert that the

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Table 1: Indonesian Warships Manufactured by the Indonesian Shipyards.

Name of ships	Type	Manufacturer
Allugoro	Submarine	PT PAL & DSME
R.E Martadinata	Frigate	PT PAL & DNSN
I Gusti Ngurah Rai	Frigate	PT PAL & DNSN
Golok	Fast Missile Boat (FMB) 60M	Lundin Industry Invest
Sampari	FMB 60M	PT PAL
Clurit	FMB 40M	Palindo Marine
Terapang	FMB 40M	Citra Shipyard
Makassar	LPD	PT PAL
Banjarmasin	LPD	PT PAL
Teluk Kendari	LST	Dock Kodja Bahari
Teluk Bintuni	LST	Daya Radar Utama
Teluk Weda	LST	Bandar Abadi
BRP Davao Del Sur	SSV	PT PAL
BRP Tarlac	SSV	PT PAL

Source: Logistics Staff of the Indonesian Navy Headquarters and PT PAL Indonesia.

competitiveness of a country is depends on the level of productivity of their local companies (Kharub & Sharma, 2017). Porter (1990) explained the diamond model emphasizes four attributes of a country's competitiveness, namely factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry. These factors can also be supported by the government and chance determinant.

Erboz (2020) states that the diamond model is one of the analysis tools in qualitative research, which serves to provide a process view for the value chain. According to Chung (2016), the diamond model is a primary analysis tool because it can provide many decent results in identifying indices that have an impact on a nation's competitiveness. To be able to increase the competitive advantage, the industry can carry out an analysis using the theory of strategic management, business strategy and business models. Shapiro (1989) stated that one of the most attractive aspects of business strategy, is its flexibility in analyzing various business strategies. Stewart and Zhao (2000) in Morris et al., (2005), Hedman & Kalling (2003); Teece (2010) explain that a business model is a term often used to describe a key component of a business.

## 2.2. Porter's Diamond Model and Competitive Advantage.

According to Porter (1990) competitive advantage can be produced from goods and services that are different and better than the same products produced by competitors. And to create competitive advantage, innovation is needed (Distanont & Khongmalai, 2020). Competitive advantage can be achieved if a company is able to utilize technology strategically, synergistically and able to adapt quickly (Gunasekaran et al., 2017). Intellectual capital can be seen as equivalent to competitive advantage, and competitive advantage comes from creating appropriate strategies for company advantage (Yu et al., 2017).

## 2.3. Warship Industry.

Competitiveness comes from the Latin's word "competer" which means involvement in business competition (Momaya, 2004). The definition of competitiveness varies and depends on

the scale, context and intended use (Fang et al., 2018). According to Fainshmidt et al., (2016), national competitiveness refers to the ability of a nation to produce and distribute services and goods in international competition. Porter (1990) mention that a nation's competitive advantage is determined by the strength of their factor conditions, demand conditions, the competitiveness of corporate strategy, structure, and competition in the industrial world.

## 3. Methodology.

This research is a participant observation ethnographic research, and in this study the researcher was involved as a participant observer. In determining the samples, the researcher use a saturated sampling technique, where sampling is based on whether or not there are still new findings obtained by researchers from interviews conducted (Purwohedi, 2022). The research is focused on PT PAL Indonesia and for other primary data, research also be carried out at the Indonesian Ministry of Defence, defence Industry Policy Committee (KKIP), Logistics Staff of the Indonesian Navy Headquarters, Staff of the Indonesian Navy Procurement Service and Daewoo Shipbuilding and Marine Engineering (DSME) representative in Indonesia.

## 4. State of the Art.

From literatures used as references, no research has been found examined the condition of the competitiveness of the warship industry in Indonesia especially by using the Porter Diamond Model. Therefore, the state of the art of this research is there is an opportunity to conduct research on the competitiveness of the warship industry in Indonesia by using the Porter Diamond Model.

## 5. Findings.

### 5.1. Analysis of the Conditions of the Indonesian Warship Industry Seen from the Porter Diamond Model Factors.

#### a. The Development of the Indonesian Warship Industry.

The role of a defense industry has a very important meaning for a nation (Lund & Karlsen, 2020), each country shows its existence through the strength and superiority of its defense industry. The Defense Industry Policy Committee (KKIP) was formed by the Indonesian government to formulate strategic national policies in the defense industry. Furthermore, based on the mandate that has been given, KKIP compiled seven priority programs; namely the development of warships, fighter aircraft, medium tanks, rockets, missiles, propellant and radar programs. The preparation of the seven priority programs was carried out by compiling a road map for the development of Main Armament System (MAS), which was divided into three stages; stage one mastery of design from 2010 to 2014, stage two mastery of technology from 2015 to 2019 and stage three perfection in 2020-2024 (KKIP, 2023).

b. PT PAL Indonesia.

PT PAL Indonesia, which is the main warships manufacturer in Indonesia has a strategic role in the Indonesian shipbuilding industry, but in producing warships especially large-sized ships, PT PAL has not fully been able to carry out the production process independently. In the process of making frigate, PT PAL Indonesia still has to cooperate with Damen Schelde Naval Shipbuilding (DSNS) Netherlands. While in the manufacture of submarines, PT PAL Indonesia also still depends on Korea's DSME. In accordance with the initial agreement, South Korea's DSME produce two units of submarines in Korea and assist PT PAL Indonesia to assemble the third unit in Indonesia (Muji Nisa & Rahaju, 2019; Nugroho et al., 2021; Sulistijono, 2017).

c. The Condition of the Indonesian Warship Industry Seen from the Factors of the Porter Diamond Model.

1. **Factor Conditions.** The availability of Indonesia's national natural resources is sufficient to meet the needs for raw materials to produce warships, but due to the limited ability and technology from related industries cause not all of the needs can be supported domestically.
2. **Demand Conditions.** The Indonesian government are quite satisfied with the warships produced in Indonesia, but for the global market warships produced by the Indonesian shipyards are not widely known, the warships produced in Indonesia have only been used by the Philippines.
3. **Related and Supporting Industries.** Supports provided by related industries in Indonesia are very limited. The government, the Indonesian Navy and the warship industry hoping that domestic industries able to fulfill all the needs of the national warship industry.
4. **Firm Structure and Strategies.** The competitive strategy of the Indonesian warship industry is good enough to face all challenges, however delays in project completion are often complained by the buyers. The more domestically produced warships used by the Indonesian Navy, the more it will provide benefits to the warship industry as well as being the best promotional ways to increase the competitive advantage of the Indonesian warship industry.
5. **Government.** The Indonesian government has supported and still committed to advancing the warship industry in Indonesia. The opportunity given by the Indonesian government to the national warship industry to comply the necessity of warships, is also consider as a great chance to the Indonesian shipyard. However, the Indonesian warship industry has not been able to take full advantage of the supports.

6. **Chance.** The occurrence of geopolitical changes and the war between Russia and Ukraine, made governments and people in the world realize that the potential for war could occur at any time, that makes Indonesia need a strong defense system to maintain the territorial integrity of the Unitary State of the Republic of Indonesia.

5.2. *The Competitive Position of the Indonesian Warship Industry Among the Warship Industries in ASEAN and East Asia.*

a. **China's Warship Industry.**

China as one of the biggest warship producers in the world has succeeded in making various types of warships, which are mostly used by the Chinese Navy.

According to Xi (2021) the development of Chinese warships had started since the era of Ming Emperor. At that time the ships of the Chinese Royal Navy were divided into four types, namely Big Jung, Fuchuan, Guangchuan, and Niao chuan. While Dangfeng Cao in Khanna (2019) mentioned that China's shipbuilding capabilities are developing very rapidly, in 2018 the Chinese warship industry able to make 27 new warships and successfully completed the process of building the second aircraft carrier. Jaquith (2021) said if the domains of the United States and Russian Navy are being threatened by the Chinese Navy, which is developing very rapidly including the development of aircraft carriers, submarines, destroyer, frigates, corvettes and amphibious ships.

Aside from the government's supports, China's ability to imitate various products including military equipment is also a catalyst in modernizing its military capabilities (Gilli & Gilli, 2019). The increasing of the China's warship industry also supported by China's economic and political situation which has changed drastically (Carlson, 2020), and supported by the ability to reduce cost production, and carry out technological transitions based on innovation (Ming Cheung, 2018).

b. **South Korean Warship Industry.**

South Korea is a place of the fourth largest shipyard in the world, namely Hyundai Samho, Samsung Heavy Industry, Daewoo Shipbuilding & Marine Engineering (DSME) and Hyundai Heavy Industry (Chuanran, 2019). The ability of the South Korean warship industry to produce several types of submarines, shows that Korea is an industrial country, able to produce various warships and as a major player in the world warship market (Bitzinger, 2019). The total income derived from South Korean warships export reached 41.1% of South Korea's total exports of military equipment (Jang et al., 2019). Several countries such as Indonesia, the Philippines and Peru are importing countries of South Korean warships (Bitzinger, 2019). The increasing of South Korea's military industry

Table 2: Chinese Warships Manufactured in China.

Name/Class	Type	Manufacturer
Liaoning	Aircraft Carrier	Dalian Shipbuilding Industry
Shandong	Aircraft Carrier	Dalian Shipbuilding Industry
Yuan 041	Submarine	Wuhan Changxing Island Shipyard
Song 039	Submarine	Wuhan/Jiangnan Shipyard
Jin 094	Submarine	Bohai Shipyard
Qing 032	Submarine	Wuhan Changxing Island Shipyard
Shang 093	Submarine	Huludao Shipyard
Han	Submarine	Bohai Shipyard
Ming	Submarine	Wucan / Jiangnan Shipyard
Luyang I 052B	Destroyer	Dalian Shipyard
Luyang II 052C	Destroyer	Jiangnan/Changxing Island Shipyard
Luyang III 052D	Destroyer	Wuhan Changxing Island Shipyard
Luhai 051B	Destroyer	Dalian Shipyard
Renhai D55	Destroyer	Changxingdao/Jiangnan Shipyard/Dalian Shipbuilding
Luzhou 051C	Destroyer	Dalian Shipyard
Luhu 956E	Destroyer	Dalian Shipyard
Jianghu II 056	Frigate	Hudong-Zhonghua / Huangpu Shipyard
Jiangkai I 054	Frigate	Hudong-Zhonghua / Huangpu Shipyard
Jiangwei II 053H	Frigate	Hudong-Zhonghua Shipyard
Jianghu V 053H	Corvette	Hudong-Zhonghua Shipyard/Jiangnan Shipyard
Jiangdao 056A	Corvette	Hudong-Zhonghua Shipbuilding
Houjian 037	Corvette	Hudong-Zhonghua Shipbuilding
Houbei 22	Missile Boat	Hudong-Zhonghua Shipbuilding
Haiqing 0371	Submarine Hunter	Quixing Shipyard
Yushen 075)	Landing Helicopter Dock	Hudong-Zhonghua Shipbuilding
Yuzhao 071	Amphious Transport Dock	Hudong-Zhonghua Shipbuilding
Yuting III 072	Landing Ship Tank	China Shipbuilding Industry Corporation
Yukan 072	Landing Ship Tank	Wuhan Shipyard
Yunshu 073	Helicopter Landing Ship	Zhonghua Shipbuilding Co.Ltd
Houbei 022	Fast Missile Boat	Various Shipyard
Yuzhao 071	Fast Missile Boat	Hudong Zhonghua Shipyard

Only big size warships listed in the table.

Source: Carlson (2020); Collins (2013); Khanna (2019); Ming Cheung (2018); Xi (2021).

to produce various types of military equipment is also intended to counterbalance the aggressiveness of China and North Korea (Harper, 2018).

### c. SWOT Analysis of Indonesian Warship Industry.

In the warship industry, SWOT analysis can be used to evaluate the strengths, weaknesses, opportunities and threats to the business, a SWOT analysis can be determined for the Indonesian warship industry among the warship industries in ASEAN and East Asia (Hossain et al., 2017). In qualitative research, strengths are defined as advantages associated with internal organizational programs, weakness is defined as a limitation related to an organization's internal program that might hinder the success of the program. Opportunities are defined as external environmental factors to increase the success of a program, threats are defined as any environmental factor that may act as a barrier to the program (Wang & Wang, 2020).

#### (1) Strengths.

- The competitive strategy has been sufficient, but delays in project completion must be concerned by Indonesian warship industry.
- The organizational structure able to answer all the challenges faced.
- Government's policy obliges users to prioritize the use of domestic warships.

Table 3: Korean Warships Manufactured in Korea.

Name/Class	Type	Manufacturer
Dosan Ahn Changbo	Submarine	DSME/Hyundai Heavy Industries
Sohn Wonyil	Submarine	DSME/Hyundai Heavy Industries
Changbogo (KDX-III)	Submarine	DSME /Hyundai Heavy Industries
Chungmugong Yi Sunshin	Destroyer	DSME /Hyundai Heavy Industries
Kwanggaedo the Great	Destroyer	DSME
Daegu Class	Frigate	DSME /Hyundai Heavy Industries
Incheon Class	Frigate	Hyundai Heavy Industries/STX offshore and Shipbuilding
Ulsan Class	Frigate	DSME /Hyundai Heavy Industries
Pohang Class	Corvette	Hanjin Heavy Industries/Korea Tacoma
Yoon Youngha Class	Killer Guided Missile	Hanjin Heavy Industries/STX offshore and Shipbuilding
Chamsuri (PKMR-211)	Killer Medium Rocket	Hanjin Heavy Industries
Chamsuri (PKM-268)	Patrol Killer Medium	Hudong/Zhonghua Shipbuilding
Dokdo Class	Landing Transport Helicopter	Hanjin Heavy Industries
Cheonwangbong Class	Landing Ship Tank	Hanjin/Hyundai Heavy Industries
Gojungbong Class	Landing Ship Tank	Hanjin Heavy Industries/Korea Shipbuilding Corp
Solgae (LSF-631)	Landing Ship Fast	Hanjin Heavy Industries
Nampo Class	Mine Layer Ship	Hyundai Heavy Industries
Yangyang Class	Mine Sweeper Hunter	Kangnam Corp
Hansado Class	Training Ship Helicopter	Hyundai Heavy Industries

Only big size warships listed in the table.

Source: Bitzinger (2019; Kwon (2018); Weitz (2013).

- There are efforts to comply the MAS to support the Minimum Essential Force for the TNI.
- The existence of transfer of technology program.

#### (2) Weakness.

- Limited quality and quantity of human resources.
- The warships produced in Indonesian warship industry are not yet globally well known.
- Limited raw material supported from related industries.
- There is a dependence on high-tech materials from other countries.
- The use of machines with conventional technology and facilities.

#### (3) Opportunities.

- There is a positive appraisalment from the Indonesian government.
- Availability of Indonesia's natural resources to support the production process of warships.
- There is support in the form of policies and facilities from the Indonesian Government.
- Indonesian strategic geographical position, to support the competitive advantage of the Indonesian warship industry.

- v. Support and involvement of educational institutions to the Indonesian warship industry.
- vi. The existence of geopolitical changes, spurring the procurement of defense equipment's.

(4) **Threats.**

- i. Limited quality and quantity of raw materials in Indonesia.
- ii. The increasing quality of warships produced by other countries, causing the competitive advantage of warships produced by Indonesia increasingly left behind.
- iii. The existence of Covid-19 and war between Russia and Ukraine, caused the prices of materials become increasingly expensive and difficult for them to enter Indonesia.

**6. Strategies Must be Carried Out by the Indonesian Warship Industry to Increase the Competitive Advantage in Global Competition.**

The use of SWOT analysis in qualitative research can help to formulate strategies, plans and overcome problems (Baez-Leon et al., 2022) and formulate strategic plans to make decisions, develop plans and strategies to be implemented by analyzing the current situation (Topuz et al., 2021; Wang & Wang, 2020). The results of the SWOT analysis will determine the best strategies (Sariisik et al., 2011).

Based on the results of the SWOT analysis of the Indonesian warship industry, several strategies can be recommended to increase the competitive advantage of the Indonesian warship industry:

a. **Factor Conditions.**

- 1. Improvement of HR capabilities in related industries and in the warship industries.
- 2. Transforming conventional facilities and technology with modern ones Transforming conventional facilities and technology with modern ones.

b. **Demand Conditions.** Indonesian Warship industry to be more professional by meeting ship delivery deadlines.

c. **Related and Supporting Industries.** Related industries must comply and support the needs of Indonesian warship industry.

d. **Firm Structure and Strategies.** Improving the quality of the warships.

e. **Government.** The Indonesian warship industry must take full advantage of all the government's supports.

f. **Chance.** Utilizing and responding to geostrategic changes by producing quality warships.

**7. Conclusions.**

The conclusion of this research shows that the competitive advantage of the Indonesian warship industry is behind other warship producer countries. Warships produced by the Indonesian warship industry are almost entirely for local consumption, not because the quality in accordance with the specifications set by the warship user, but because of Indonesian Government policy obliges users to prioritize the use of domestic warships. Warships produced by the Indonesian warship industry are still not globally well known and unable to compete at the global market.

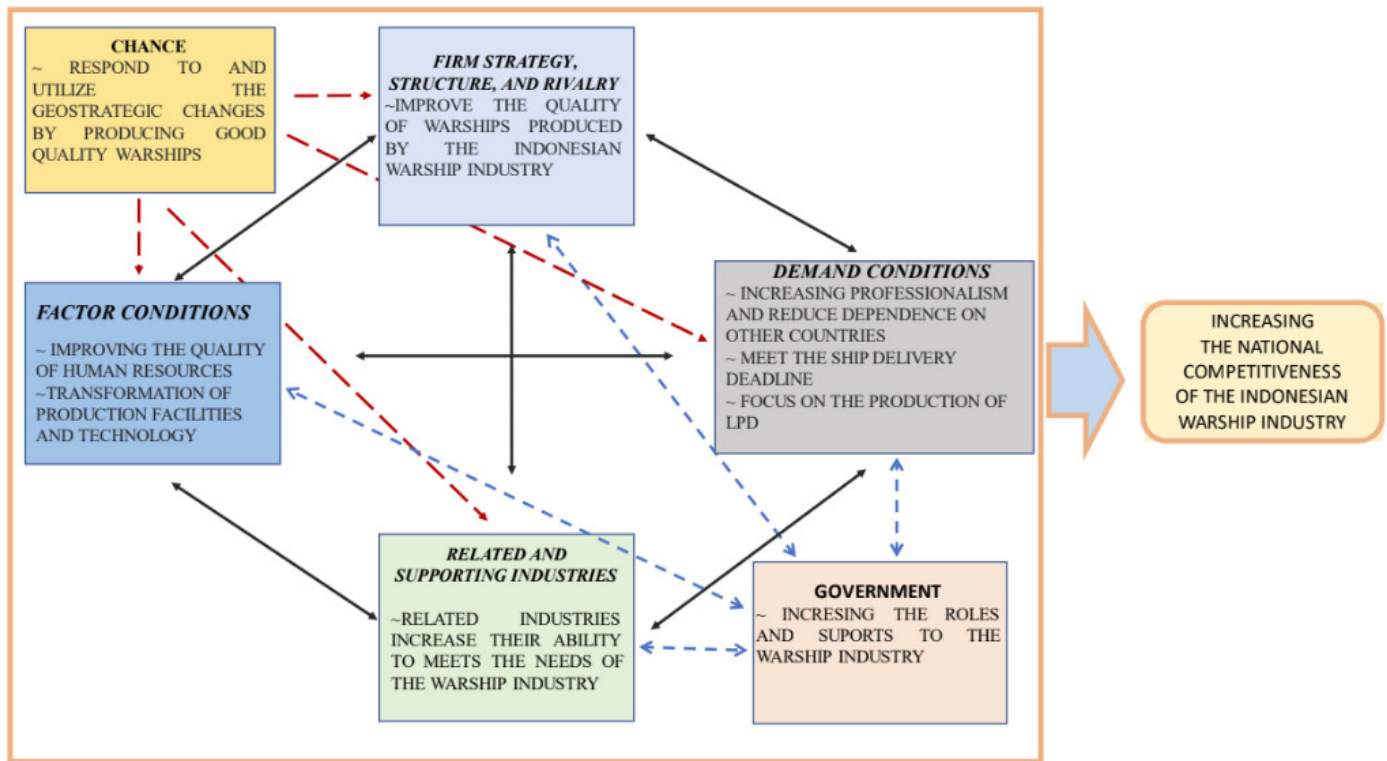
**8. Recommendations.**

Based on the research, the following recommendations can be made:

1. Optimizing all the determinants in the Porter Diamond Model related to the warship industry in Indonesia, through:
  - (a) Increasing the ability of human resources in the warship industry.
  - (b) Transforming conventional facilities and technology with modern ones.
  - (c) Increasing the professionalism of Indonesian shipyards to be more compliant with ship delivery deadlines
  - (d) Increasing the ability of supporting industries in Indonesia to meet the needs of the warship industry
  - (e) Increasing the government's supports for the Indonesian warship industry
  - (f) Encouraging the Indonesian warship industry to take full advantage from all the supports provided by the government, and respond the geopolitical changes to increasing the competitive advantage of the Indonesian warship industry.
2. Indonesian shipyards must improve the quality of warships and promote warships intensively. Observe, imitate and modify (OIM) techniques carried out by industries in China can be chosen as an option. With OIM techniques, China's industry has grown very rapidly and has become one of the biggest industry countries in the world.
3. Indonesian warships industry focus on the LPD. If the Indonesian warship industry focus on the LPD and continues to innovate to maximize the excellence and quality, then the LPD can become the flagship product of the Indonesian warship industry and also increasing the competitiveness of the Indonesian warship industry in the global competition.

Based on the research, the Porter Diamond Model for the Indonesian Warship Industry can be proposed.

Figure 1: Maniur Pane's Model for Increasing the Competitiveness of the Indonesian Warship Industry Based on the Porter Diamond Model.



Source: Prepared by authors.

### Model's description.

In accordance with the diamond model theory developed by Michael Porter, all determinants in the diamond model are interrelated and influence each other, but sometimes some determinants have stronger influence than others (Figure 1). The black arrow lines shows that firm strategy, structure and rivalry (FS), demand conditions (DC), related and supporting industries (RS) and factor conditions (FC) influence and strengthen each other. The blue dotted arrow lines shows that government influence and can also be influenced by FS, DC, RS and FC. Meanwhile, the red dotted lines illustrate that chance can influence FS, DC, RS and FC, but on the other hand chance cannot be influenced by other determinants because chance comes only from outside of the warship industry.

If the Indonesian warship industry and all related stakeholders optimize all the determinants by responding to and utilizing geostrategic changes, improve the quality of warships, increasing professionalism and reducing dependence on foreign products, meeting ship delivery deadlines, focusing on the production of LPD type warships, increasing the roles and supports of the government, related industries increase their capabilities to support the needs of the warship industry and if the Indonesian warship industry improves the quality of human resources and carries out transformations in production facilities and technology, then the competitiveness of the Indonesian warship industry will increase and be able to compete not only at the regional

but also at the global market.

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