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Analysis of Strategic Environment and Characteristics of the World's Defense Industry

(A Case Study in Israel, Union Arab Emirates, and China)

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Abstract: *In the discourse on defense, especially in the context of military defense, defense readiness and defense independence are two topics that become a matter of contention for policy makers, with significant political implications if they are not considered. Defense readiness is the availability of the elements needed in a defense effort, both human and equipment and supplies as well as other supports, as well as the ease of deploying these elements. Meanwhile, independence is understood as how capable a country is to carry out these elements by itself using all the resources owned by the country. This study aims to analyze the relationship between the condition of a country and the defense industry model that is built and implemented. The research conducted this time can be understood as a qualitative literature study. The data collection method used in this study consists of several methods aimed at retrieving as much data as possible. The data collection method used in this survey is a document survey. The conclusions drawn from the research conducted are that the social aspects of the country's strategic environment may influence the relationship between the organizational structure of the country's defense industry and its networks and subsystems, as well as the relationship with the contextual history of a country.*

Keywords: Defense industry, industrial subsystem,innovation framework, PESTLE,strategic environment,

I. INTRODUCTION

Dynamic of the world strategic environment condition is always changed according to the political change at national system, regional, and global level. The change at the end will determine the typology of threat, conflict shape, and conflict exhalation which can affect political stability. Significance in understanding the strategic environment for a country will determine analytical understanding to assign the foreign policy. In discourse of defense, especially in military contex, defense readiness and independence are two contradictive topics for the stakeholders, with significance political implication because of the inattention. Defense readiness is the readiness of necessary elements in a defense effort, contains of human resource, main and support equipments, and the ability to mobilize it all. Meanwhile, defense independence is the ability level of a country to provide the elements by itself with using all of its resources.

Today, there is trend that global defense industry that have ability to supply defense high technology is dominated by a few multinational companies from a few countries. The condition reflects inequality of the mastery technology that implicate the difficult of technology mastery and defense industry development. The phenomena impulse almost some countries in the world to make exclusive policy about defense industry development. Especially in Indonesia, the development of defense industry institutionally is supported by Law Number 16 of 2012 about Defense Industry.

Until present, independence is the main concept that applied by the national governments in the world. The concept that the world international political concept, especially in discourse about military strength, naturally is an

anarchy and always changing to stimulate the growing of belief that national security is the vital issue and needs to be prepare independently. It means that humans as the soldier, the equipments, the resources, and the technology to provide it all. The implication of defense independence is country needs to develop the defense industry capability in order to provide military equipments that can support the soldiers.

In fact, a country still has own limitation of the resource and the practical needs to keep military ability than the identified threats. Defense industry, as common industries, need essential resources like material, knowledge, technology, machine, liquid modal (money), and good management supportfor the continuity. On the contrary, military needs of the country in main and supporting equipments need specific update according to the technological development and the law of international relation. It forces the stakeholders to determine the limitation of independence than the readiness. A fully independence country in military but uses the lagging equipments in technology than its enemies will be difficult to take the victory.

The dilemma is the main reason why the planning of military is needed according to the country's modal and strategic environment by identified threat. The stakeholders need to determine the portion of military procurement that can be done by theirselves. Moreover, the development of defense industry needs to be adapted with the government's political strategy, domestically or internationally. A defense industry development model of the country is needed.

This research aims to analyze correlation between the country condition with the implemented defense industry model. So that this research produces steps followed by the countries in the world to choose their defense industry model and to build their defense industry according to their condition.

II. RESEARCH METHOD

This research can be understood as qualitative literature study. Sugiyono (2016) explained that qualitative research as a research method based on postpositivism philosophy to research in natural condition by the researcher as the key instrument. Data resource sampling is done purposively followed by triangulation technic, inductive or qualitative data analyzing, and the meaning-based result. The thinking framework of this research shows that the research uses grounded theory approximity. Creswell (2009) defined the grounded theory research as "qualitative strategy investigation which the researcher gets abstract of the main theory from process, action, of interaction according to participant's view in study." Observation is done by define of the phenomena uses defined tools. From observation result, the framework to formulate the results during analyzing is found.

Data collection technic of the research is contained of some ways to collect data as some as possible. The technic is adjusted to research purpose by document study. The document is divided into 2 groups:

a) Official documents formulated by the government official agency e.g manifest, law, press release, official research, etc. as primary data.
b) Academic literature like journal and research paper by non government research agency as secondary data.

In some cases, official documents are summarized by particular literature into the more simplified form and can be presented. In that case, direct notes of the literature can be noticed as primary data.

III. LITERATURE REVIEW

A. Strategic Environment

Strategic environment as a terminology is actually a term that is closely related to military strategy and international politics. This is because the use of this term was originally intended to assess the international situation around a country. Strategic Estimation, or what is more commonly referred to as the Strategic Environment, is defined from a military perspective as "the various strategic factors that influence a commander's understanding of his operational environment and the determination of his mission, goals and actions" (DoD, 2016). The key to the concept of strategic environment is understanding from one point of view (the commander, who is considered a person in power) of the surrounding area. Strategic estimation allows for assessment bias, which allows strategies to be structured around the objectives of the rater.

B. Defense Industry

The understanding that the world's international political system, especially in the discourse related to military power, is naturally anarchic and constantly changing, encouraging the growth of belief that national security is a vital issue and needs to be met independently. This trust is the basis for the formulation of policies for the development of an

inclusive defense industry. The development of the defense industry is also seen as a way to spur economic development and industrialization of a country in general. The linkage of the defense industry with other industries such as the steel industry, the machinery industry, and the shipping industry can provoke expansion and modernization in these fields (Willet, 1999). Industrialization and technology development increase the competence of developing domestic weapons manufacturing capabilities, through skills education and general knowledge, as well as providing support and weapons production equipment (Bitzinger, 2015). The defense industry development effort can also be seen as an effort to accelerate the speed of technology development (technology locomotive), especially in technology that is still classified as high-end, such as aerospace, information technology, and electronics. Acceleration of development is also carried out when a technology to produce a defense system is not yet owned. Several countries also view the development of the defense industry from an economic perspective; A government's investment in the defense industry is carried out as an effort to maintain domestic liquid capital, compared to buying finished defense equipment from other countries.

C. Defense Product Flow

Talking about the production of material products, the principles of supply chain flow generally apply. The production of a system of objects can be traced to the assembly process and production process of each subsystem, down to the simplest level of procurement and processing of basic materials. Furthermore, the process of distributing finished goods to both the domestic and international markets involved needs to be considered. The nature of modern defense products, which are generally complex and consist of several functions, forces production to divide the focus into several sub-systems. Each of these sub-systems, of course, consists of several components/parts, which are produced from several processed raw materials. Referring to the reasons why a country develops its defense industry, there are several models of running a defense business. Hartati, et al. (2014) describes 3 types of general models that can be identified:

Autarky Model.A country builds a defense industry in order to achieve maximum independence in all aspects in order to achieve a strategic value of a political nature. Thus, the government's role in the autarky model is very large. In some cases, such as Turkey & Indonesia, government-owned enterprises directly control the main process of defense equipment production, with the production of subsystems and smaller parts carried out by both government-owned and private companies. Meanwhile, there are also cases where the government provides direct support for private conglomerates to produce defense equipment domestically. One example of this type of case is the South Korean government's support for Samsung and Daewoo.

Niche Model.A country can choose to specialize in certain defense technologies or instruments and then compete in a market that is limited to those instruments/technology. The niche model works on the basis of meeting a limited market for a system/subsystem. In simple terms, this means trying to dominate every market share and from a number of specialization products. One example of a country taking this approach is Israel.

Global Supply Chain Model. On the other hand, a country can choose to join the global supply chain of a defense equipment system. Practically, the global supply chain model works like the niche model, but countries with a global supply chain model are usually tied into a military alliance or defense pact.

In addition to the three models described by Hartati, et al. (2014), there is another classification of models commonly used, namely the Oligopoly model. The oligopoly model occurs in the product market, and not the country itself specifically. The oligopoly market is basically divided into perfect oligopoly and imperfect oligopoly based on the product. Products sold in a perfect oligopoly market are usually similar products (imaginary differentiation). Imaginary differentiation is usually associated with products that require little (or no) further processing, so that the physical and quality are mostly the same. Meanwhile, the imperfect oligopoly market has several variants of specifications from one producer to another.The defense industry is an example of an imperfect oligopoly. The practice of oligopoly in the defense market can be found in the air defense system. The market share of fighter jets is only controlled by companies such as Boeing, Lockheed Martin, BAe System, Rosobon export. While other fighter aircraft manufacturers work on a limited basis in their own country of origin.

A different approach is taken by Bitzinger (2015) who argues that basically every country wants to get as much autarchy of the defense industry as possible, but the limitations and realities of international politics force countries to adjust their approach in building a defense industry. So, a country with a niche model is a country that takes limited autarchy. So, Bitzinger models the defense industry in world countries into a pyramid model. This division is based on

the production capacity (assessed by the number and area of the defense industry area) as well as the technological level of the exported products.

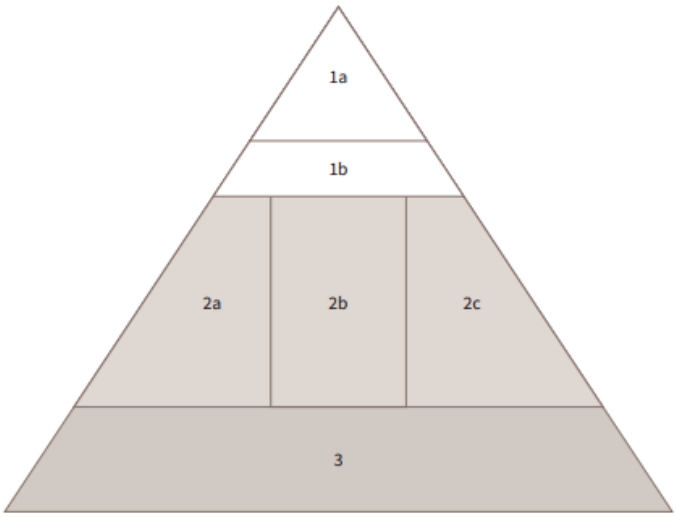

Figure 1.Bitzinger's Defense Industry Level Pyramid

Source: Bitzinger, 2015

At the highest level (1a), there is a political superpower with a large capacity defense industry. The main characteristics of a country of this level is that it has a large defense industrial base, as well as a broad base, and is technologically advanced. An example of a tier 1a country is the United States. While at level (1b), the country has a smaller defense industrial base, but with a broad base, and advanced technology. Example country level (1b) UK, France, Germany, Italy. At level (2a), the defense industry base is smaller, and has a specific product orientation (niche), and is technologically advanced. i.e. Israel, Sweden, Japan, Australia. At level (2b), the defense industry base is smaller, broad-based, but the country is not counted as a technologically advanced country. Examples of level (2b) countries include South Korea, Brazil.At level (2c), the country has a large and broad-based defense industrial base, and yet the country is not counted as a technologically advanced country. i.e. China, India.And at level (3), the country has a smaller, niche-oriented, low-tech defense industrial base. i.e. Mexico, Nigeria, Serbia.

IV. Research Result and Discussion

A. General Description of the Defense Industries in the World

The developed countries e.geuropean countries that binded each other politically and historically build their political framework by regional organization like European Union (EU). Meanwhile, the developing countries like Asian and African countries get downsizing at their defense industry because of many reasons. In some cases of developing countries, the defense industry is built forced from the beginning. The change is seen at supply concentration change. Supply concentration is a concept that shows how much a market is diversified. It is counted by Herfindahl–Hirschman Index (HHI). HHI value has distance 0 until 1. If the value is getting lower, the market is more diversified. It means the increase of involved player number. On the contrary the higher HHI value shows the condition approach to market monopoly.

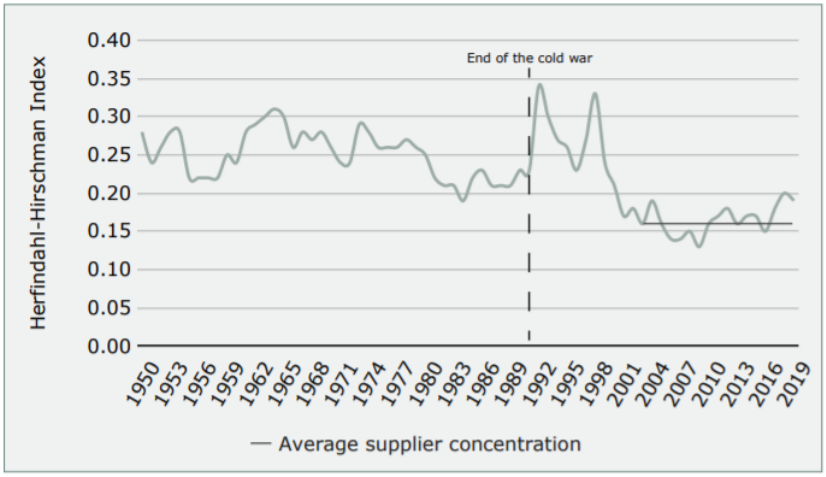

Figure 2. HHI Value of Global Defense Market

Source: Sipri Database, retrieved from Beraud-Sudreau et al. (2020)

In early 1990s, supply concentration between the weapon exporter increased significantly when US was the largest weapon exporter in the world and weapon export from USSR and the successor Rusia decreased significantly. By the dissolving of USSR and ending of the regional conflicts, global demand of weapon needs was decreased. Tingkat konsentrasieksporsenjataberubahlagipadaperiode 2000-an, dandiversifikasimencapaititiktertingginyapadatahun 2009. Supply concentration mean between 2003 and 2019 was in the lowest level for the whole period. Two main factors forced increase of the diversification. Decrease of US market enabled increase of another market. At the same time, Rusia started to rebuild relation with former USSR's clients and opened some new market e.g China and Venezuela. According to Bitzinger theory (2015) about country position in the world defense industry pyramid level and the given example, the researcher chooses the level 2(a), 2(b), dan 2(c) countries base on the table of exporter level in 2016-2020.

At level 2(a), Israel occupies 8th position as the weapon exporter and be one of the feasible samples. Israel is the medium size country based on its population with the large international influence. At level 2(b), there are two feasible examples, Turkey (pos 13th) and UAE (pos 18th). Both have the different modal and rule. Turkey is the large country in population with large army. But UAE is an opposite. In between, the choice needs to adjust the included options. So, before continue the choice at level 2(b), the choice at level 2(c) needs to be done earlier. At the level 2(c), China PR occupies 5th position as weapon exporter, so that it's feasible sample. China is the largest country in population with the significant large army. China can be understood as the new most powerful country so it is interested to be discussed. Israel is the example of moderate country and China is the example of large country in this research. According to the framework used in choice of level 2(b), the researcher decides to choose UAS as the example of level 2(b). UAE is the country with small population with different government shape than two other countries, so that it can be a comparation to the influence of government difference in defense industry contex.

B. Israel's Defense Industry

The used data resource to get information about Israel's defense industry generally is two academic papers. The first paper is "The Changing Role of the Defense Industry in Israel's Industrial and Technological Development" by DovDvir&AshlerTishler and published in Defense Analysis vol 16(1) at 2000. The second paper is "Israel's Arms Industry" olehNaaz and published in Strategic Analysis Journal at 2000. The two papers have covered data from official documents and view of the experts. The official documents about Israel are difficult to get. In 1950s, the defense industry was developed by establishing of some new organizations that mostly are belong to the government. An R&D division was established in 1952 at Ministry of Defense. Some private defense companies were established in 1950s. Soltam, an artillery maker, was established as consortium company with Finlandia, whose give necessary technology and knowledge. Tadiran, a largest military communication company, was established by combining of some private companies that make dry cell and light bulb.

The golden age of Israel's defense research was the war age in Israel History. Naaz (2000) explained that there are two main factors why Israel decided to build their own defense industry by itself. Firstly, the dependence to foreign equipments at Suez crisis compliceted Israel in the wars after because of embargo effect from the former supplier countries. Israel wanted to have reliable military suppliers especially at the crisis situation. Secondly, Israel defense procurement needs at the time was the heavy obstacle for domestic economy. Bahbah (1986) recited by Naaz (2000) explained that in 1966-1972, Israel military import increased from 116 milion USD to 800 milion USD. Moshe Kashti, the defense industry director at the time, recited by Bahbah (1986) and Faaz (2000), said that the building of industry ability contributes to 50% of the deficit of balance trade in 1968. The same trend was also happened after six days war, while Israel defense import increased 3 times.

Deceleration of defense industry's growth, started in the middle of 1980s, changed into critical crisis in 1990s, after the end of cold war and the signing of peace agreement between Israel and its Arabic neighbor countries. The cutting of Israel defense budget from 13,2% to 8,2% in 1992 was the opposite mark of Israel defense industry. The cutting was caused by the critical inflation after 1982 (about 1000%) followed by Israel needs to keep its position as the center of manufacture research and technology (Naaz, 2000). Today, Israel defense industry contains of about 150 companies. Ten companies give 78% of defense industry workers, 82% of total income, and 87% of total export. More than 75% of defense products is exported. The defense system products give 32% of Israel industrial export.

C. UAE's Defense Industry

Research to UniEmirat Arab (UEA) is a topic focused by defense industry researcher communities, especially by the researchers focusing in middle east weapon distribution. Research done by Béraud-Sudreauet. al. (2020) to the UAE historical data with literature review resulted:

UEA had mostly invested in weapon import since 2000 as one of ten largest global weapon importers. At the same time, UEA started to develop its weapon industrial base. To do that, from 1990s UAE adopted offset requirements as a part of weapon import policies. Some of the offset obligations are requirement of foreign company to export the weapon for UAE to develop the joint production ability, technology transfer, and investation in UAE weapon company's production. As implication of the policy, UAE accepted foreign ilitary technology e.g from Brasil, Canada, South Africa, USA, and western european countries that allowed to produce main weapons and the components progresively.

The significant development was the establishment of conglomerate weapon producent, Emirates Defense Industries Company (EDIC), in 2014. With some smaller companies, EDIC was acquisited in 2019 as new government company named EDGE. Total income of EDGE reached US$4,75 billion in 2019 which 95% parts estimated as weapon selling from domestic procurement. UAE weapon industry is based on import of technology and component, e.g the body armour and guided missile from South Africa, Corvet from France, and ammunition also components from another resources. The significant export products so far are armoured vehicle, unmanned aircraft (UAV) and small logistic vessel.UAE is one of 20 largest weapon exporters in 2015–2019 with the export volume 86% since 2010–2014. Between the decade of 2010–2019, the largest UAE's weapon importers are Egypt, Libya dan Jordan. Generally, UAE exports their weapon to middle east (55% of total volume) and Africa (35%).

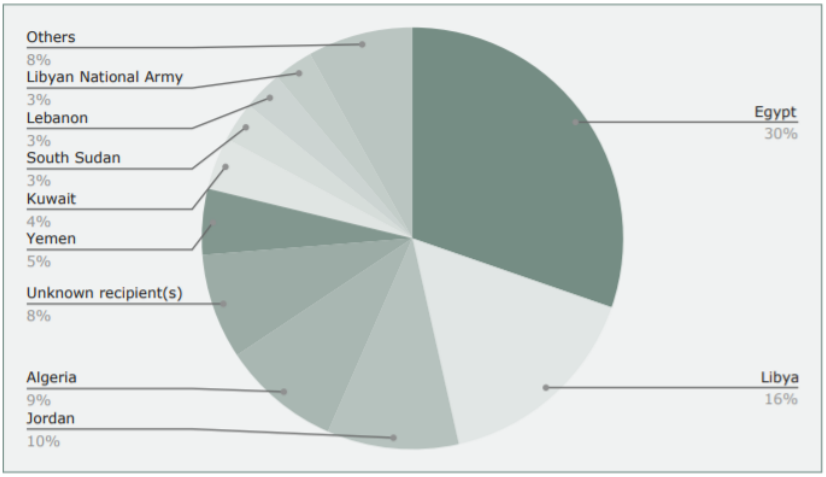

Figure 3. Percentage of UAE's Weapon Importers

Source: Wezeman, Kuimova, Wezeman (2020)

Two-thirds of UAE's export between 2010 and 2019 is armoured weapon include Panthera T6 for Egypt (licence product) and Cameroon. UAE exports also Cougar to Nigeria, South Sudan, Yaman, and maybe Egypt, and Nimr to Aljazair, Turkmenistan and Yaman. About quarter (27%) of UAE's export is unmanned aircraft. Some of that is produced domestically (e.g UAV Yabhon exported to Aljazair) but the rest is the second-hand (e.g helicopter for Lebanon and ground attack aircraft for Jordan and Egypt). 19% of UAE's weapon export volume is the second-hand.

D. China's Defense Industry

China is the second largest weapon producent in the world and keep trying to develop the ability of weapon industry. Increase of equipment and technology ability are main focus of China military modernization campaign. Chinapower, one of the CSIS' sub-organs, said that from 2010 to 2017 China's annual military expenditure increased from $26,2 billion to $63,5 billion. In 2010, 33,3% of total military expenditure was used for the equipments. In 2017, the number reached 41,1%.

Most of PLA's equipments and technologies is supplied by nine state-owned enterprises and a government research institute. According to the Stockholm International Peace Research Institute (SIPRI) database, at least four China's weapon companies were the 25 world largest weapon companies in 2019 (according to the export value). The companies are: Aviation Industry Corporation of China (AVIC), China Electronics Technology Group Corporation (CETC), China North Industries Group Corporation (NORINCO), and China South Industries Group Corporation (CSGC), each one in 6th, 8th, 9th, dan 24th position. The companies resulted $56,7 billion in weapon selling in 2019. It makes China in the second position after USA. But China's companies collect more sellings than the companies of the three next position countries (Inggris, Prancis, danRusia) when combined.

Table 1. Holding of China Defense Industry

Sector	Company
Aerospace	Aero Engine Corporation of China (AECC)
	Aviation Industry Corporation of China (AVIC)
	China Aerospace Science and Industry Corporation (CASIC)
	China Aerospace Science and Technology Corporation (CASC)
Electronics	China Electronics Technology Group Corporation (CETC)

Land Systems	China North Industries Group Corporation (NORINCO)
	China South Industries Group Corporation (CSGC)
Nuclear	China Academy of Engineering Physics (CAEP)
	China National Nuclear Corporation (CNNC)
Shipbuilding	China State Shipbuilding Corporation (CSSC)

Source: chinapower.org, 2021

By President Xi Jinping, China has intensified reach of MCF (junminronghe) to make defense industry's base more efficient and innovative. The MCF concept was established in China at least since 1980s. The integration of civilian and military (junminjiehe) reflected effort of USA and another country to promote joint development military and civilian industry's base. But MCF is going further from just looking for civilian and military integrated development. DoD annual report in 2020 about China military imaged MCF as national effort to unite the China's strategy of economy and social with security strategy to build national integrated strategy of system and ability to support China's national development.One of the important steps to development of innovation is increase the R&D expenditure. The R&D national expenditure increased more than 35 times between 1991 and 2018, from $13,1 billion to $462,6 billion. Meanwhile China's R&D expenditure was still at the second position after AS in 2018.

Table 2. Comparison of Israel, UAE, and Cina Defense Industry

Indicator	Countries		
	Israel	UAE	China
Politic	Democracy Alliance	Group Domination	Group Dominition
Economy	Established Government Limited Market	Established Government Natural Resource	Established Government Large Domestic Market
Social	Race Domination High CMI	Low CMI	Race Domination Unknown CMI
Technology	High	Low	Middle
Legality	According to the Jew's rule of law	FTZ Region	ruled by law
Environment	Monotone	Monotone	Various
Catalitic	War	Government Will	Government Will
Input	Foreign Investation followed by Domestic Investation Domestic Market	Domestic Investation Foreign Market	Foreign Investation followed by Domestic Investation
Institution	less information rule of law Conextual	ruled by law	ruled by law
Organization	MoD State-owned enterprises	1 Holding	Politburo Some Holdings
Network & Subsystem	Some persons Military experience	Some families	Some pseudo-political pocket
Contextual	War and threat	Peace and Export	War and threat
Output	Needs based High tech	Demand based Low tech	Various

Sources : Data processed, 2021

V. CONCLUSION AND RECOMENDATION

The conclusion of the research is social aspect of country's strategical environment may have influence to the

organization structure of defense industry and have correlation of country's historical aspect. This research has succeeded to identify influence between social aspect of country by PESTLE and choice of defense industry structure, network & subsystem establishment in defense industry, and historical context beside defense industry establishment. But character of the established relation between social aspect and each aspect at Cheung's innovation framework is still be an unanswered question in this research. The topic can be researcher's focus to research about many factors behind the defense industry establishment.

The conclusion is an indicator that social aspect is probably a main focus of the stakeholders on establishing of defense industry in their own region. The thinking is based on the comprehension that the organization model of defense industry is a conceptual idea which established at the beginning and change during the change of stakeholder's perception (in case of Israel). In another word, researcher thinks that during change of the perception, social aspect may be the main factor with largest influence than the other factors. Therefore, the social aspect needs to be main topics evaluated during the measure of defense industry's goals.

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