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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

**ANALYSIS OF GOVERNMENT POLICIES TO
SUPPORT SUSTAINABLE DOMESTIC DEFENSE
INDUSTRIES**

June 2015

**By: Roni Marzah and
Budi Setiawan**

**Advisors: Max V. Kidalov
Francois Melese**

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**ANALYSIS OF GOVERNMENT POLICIES TO SUPPORT SUSTAINABLE
DOMESTIC DEFENSE INDUSTRIES**

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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ANALYSIS OF GOVERNMENT POLICIES TO SUPPORT SUSTAINABLE DOMESTIC DEFENSE INDUSTRIES

ABSTRACT

Armed forces all over the world need military equipment to support their security missions. Having a domestic defense industry is one approach that countries use to supply their armed forces' requirements. The successful development of a domestic defense industry depends on many factors, but perhaps the most significant variable is the government. Because governments are both buyers and suppliers of national security, government policies are often designed by governments to support and regulate their domestic defense industries. This professional report explores the costs and benefits of various government policies to establish a sustainable defense industry. The report focuses on government policies in the United States, the United Kingdom, France, and South Korea, because defense industries in those countries have proven track records and tend to be profitable and sustainable.

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LIST OF ACRONYMS AND ABBREVIATIONS

BIS	Bureau of Industry and Security
C4ISR	Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance
DAPA	Defense Acquisition Procurement Agency
DCED	The Donor Committee for Enterprise Development
DGA	Direction Generale de l'Armement (General Directorate of Armament)
DIP	Defense Industrial Policy
DIS	Defense Industrial Strategy
DOD	Department of Defense
DODI	Department of Defense Instruction
DPA	Defense Procurement Agency
DRET	Directorate for Research, Studies, and Techniques
DTS	Defense Technology Strategy
EUR	Euro
FAR	Federal Acquisition Regulation
GAO	Government Accountability Office
GATT	General Agreement on Tariffs and Trade
GBAORD	Government Budget Appropriation or Outlays for Research and Development
GPA	Government Procurement Agreement
IPTN	Industri Pesawat Terbang Nusantara (National Aircraft Industry)
IR&D	Independent Research & Development
MIBP	Manufacturing and Industrial Base Policy
MOD	Ministry of Defense
NATO	North Atlantic Treaty Organization
R&D	Research & Development
RNLN	Royal Netherlands Navy
SBIR	Small Business Innovation Research

SIC	Standard Industrial Classification
SIPRI	Stockholm International Peace Research Institute
SME	Small and Medium Enterprise
STTR	Small Business Technology Transfer
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNCITRAL	United Nations Commission on International Trade Law
WTO	World Trade Organization

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I. INTRODUCTION

Si vis pacem, para bellum means, “If you want peace, prepare for war.” This quotation is adapted from a statement by Publius Flavius Vegetius Renatus, a Roman writer in the fourth century (Milner, 1996). A critical part of military preparedness includes making or procuring defense equipment that countries hope they will never use. Building a credible defense force creates valuable deterrence.

The problem that arises when countries equip their defense forces is whether to “make” or “buy.” A domestic defense industry offers the possibility of making defense equipment. The successful development of a defense industry depends on many factors, but perhaps the most significant variable is the government. Because governments are both buyers and suppliers, with the responsibility to guarantee national security, many policies are created by governments to support and regulate their defense industries. This professional report examines costs and benefits of defense industry policies. It identifies policies which are affordable and support a sustainable defense industry, and others which are unnecessarily costly and which could prove a burden to industry and the country.

A. BACKGROUND

Prior to delving into government policies and their impact on a domestic defense industry, the term “*sustainability*” must be defined. Based on the global defense industry classification provided by Bitzinger (Bitzinger, 2009), a *sustainable defense industry* can be categorized into one of three tiers:

- Tier I is a defense industry that is able to support the basic needs of its country and achieve success in global market competition with little or no government involvement in its budget or protection policies. At this level, the defense industry is a critical innovator in the technology of arms suppliers.
- Tier II is a defense industry that can provide only the basic needs of its country with government support of the budget and protection policies. At this level, the defense industry has adapted and modified technology to produce defense products by arms suppliers.
- Tier III is a defense industry that can assist only its country’s basic needs due to a limited budget and dependency on government. At this level, the

defense industry has copied other countries' arms equipment and produced the equipment without any further improvements (Bitzinger, 2009).

Domestic defense industries enable countries to supply some or all of their own defense equipment needs. Because of this strategic function, many countries try to develop and protect their defense industries (Gansler, 1980). Governments routinely impose laws and regulations to protect their defense industries, take investment stakes in defense enterprises with a view to a voice in governance, or even take majority ownership or control outright. These measures, laws and regulations have often over-protected defense industries or even inadvertently restrained improvements in those defense industries (Dunne, 2009). This situation may lead the domestic defense industry to become stagnant within its tier, and increasingly dependent on government subsidies, becoming a fiscal burden on the government, and eventually leading to its collapse or bankruptcy. In attempting to provide security benefits through favorable regulation and subsidies of a domestic defense industry, the end result may be an unacceptably high cost to the government and the population. To avoid this outcome, the main function of government defense industry policies should be to make sure its domestic defense industry has a sustainable business model; only then can the domestic defense industry serve the country.

Domestic defense industries in every country have their own comparative advantages, and governments, as the supporters of the defense industries, may be in a position to develop some advantages to help the defense industry become a successful business. This can happen if the government is able to provide the right policies and implement them wisely.

The Netherlands is a good example of how a government supports its comparative advantage in naval shipbuilding. The Royal Netherlands Navy (RNLN) has been a blue water navy for centuries and has many types of ships, include frigates, submarines, mine hunters and minesweepers, supply ships, and amphibian vessels. All these ships have been built in Dutch shipyards. The Netherlands recently established a "national champions" policy to support its naval shipbuilding by giving a contract to the Dutch firm, Schelde Naval Shipbuilding. The contract was for four patrol vessels with a value of €240 million (Berkok, Penney, & Skogstad, 2012). The four patrol vessels were built for the RNLN. Schelde Naval Shipbuilding, itself a part of the Damen Shipyards Group, has successfully

exported ships worldwide. Thus, targeted defense contracts may help a domestic industry's international competitiveness.

Defense industries and governments cannot be separated if governments are the primary stakeholders in those industries. Therefore, the success of domestic defense industries generating benefits to countries depends on how governments create and apply the right policies, through a careful analytical process to evaluate the costs and benefits of those policies.

Policies imposed by governments regarding their domestic defense industries should be analyzed and filtered based on the benefits and costs that they create, and then to ensure that the benefits outweigh the costs incurred to achieve desired outcomes. The result of this process will help identify appropriate policies that contribute to a sustainable and profitable domestic defense industry.

B. OBJECTIVES

This research explores the relationship between government policies and industries, especially the defense industry, to find out which policies might support a sustainable defense industry. We begin by defining sustainability, identifying factors that support defense industries, exploring how to measure sustainability, and then reviewing various government policies. We then analyze policies implemented by several exporter and importer countries of defense articles, and the countries' successes or failures in sustaining their defense industries. The analysis continues by comparing the benefits and costs of implementing those policies, and recognizing which policies benefit defense industry sustainability, and which are likely to fail.

C. SCOPE AND LIMITATION

This research discusses business sustainability only in the defense industry, and does not discuss the overall security of countries nor specific details regarding their industrial policies. The focus is on government policies that impact the defense industry. Sustainable defense industries are analyzed and compared in order to determine whether beneficial aspects of government policies in arms-exporting countries may have

contributed to that success, and whether those policies might be appropriate for other countries.

The countries referred to in this research are arms exporter countries, which are in tier I, tier II, and tier III categories, as described by Keith Klause (Bitzinger, 2009). The countries are the United States, the United Kingdom (UK), France, and South Korea. These countries were selected because they have sustainable defense industries. Russia is also included as a tier I country, but limited data does not allow us to include it as a case study. South Korea was included in this research because it has significantly increased the number of companies that make up its defense industry and total defense sales, in just over a decade (2003–2013).

D. METHODOLOGY

The research for this project was conducted at the Naval Postgraduate School in Monterey, CA. The research uses existing data and literature on acquisition and procurement, economic development, and international trade, gathered from the Internet, previous research, and other primary sources. It includes

1. a review of the literature about government industrial policies and infant industry protection
2. an analysis of existing policies in countries that have successful and sustainable defense industries
3. a comparison of policies between countries
4. an analysis of the benefits and costs of these policies to help explain defense industry development and sustainability
5. a determination on whether the research supports the hypothesis that cost-effective government policies exist to promote a domestic defense industry
6. a research report.

E. RESEARCH QUESTIONS AND THESIS STATEMENT

In this research project, the following questions are addressed:

1. What is the definition of a sustainable business?
2. What factors explain sustainability?
3. What kind of government industrial policies are used in the defense sector, and what is their relationship to a sustainable defense industry?
4. What unintended consequences appear most significant in creating a sustainable business in the defense industry?

5. What are examples of successful policies that countries create and implement to support their defense industries' sustainable businesses?
6. What policies fail to support a defense industry's sustainability?
7. What lessons, if any, can be learned from these countries?
8. What are the costs and benefits generated from government policies targeting the defense industry?

The domestic defense industry is a very valuable asset for a country because it can support the country's need for arms to equip its military force. Defense and security are sensitive issues because they also relate to national identity (Gansler, 1980). As stakeholders in the defense industry, governments routinely initiate policies designed to support the industry's sustainable business model. Based on the existing literature, a number of public policies are found in countries that have a defense industry. (Berkok, Penney, & Skogstad, 2012). However, most countries only apply a subset of these policies.

There are several common and key policies that are responsible for the success and sustainability of a defense industry. Some countries successfully select policies that support a sustainable and profitable domestic defense industry. Unfortunately, in many other countries, government policies contribute to the industry suffering losses.

This research defines the meaning of a sustainable business in the defense industry, and attempts to identify government policies that contribute to a sustainable and profitable defense industry. Successful policies are identified by analyzing the implementation of those policies in several countries that have proven to have sustainable and profitable defense industries, such as the United States, Western European countries, and other countries included in the top 100 arms-exporter countries listed by the Stockholm International Peace Research Institute (SIPRI). After identifying several key policies used in practice, this research explores the costs and benefits that countries realized when they implemented those policies.

The costs must include opportunity costs. These are indirect costs that appear when government policies favor the defense industry. For example, facing budget constraints, if a government policy is to subsidize the defense industry, then the opportunity cost is the sacrifice of the next best alternative use of those funds in terms of other government programs or reduced taxes, etc. Following the analysis, this report summarizes the findings,

and offers recommendations for further research or implementation by other countries that might improve the sustainability and profitability of their defense industries.

F. ORGANIZATION OF STUDY

Chapter I presented the problem and background of this project. Chapter II studies the defense industry and identifies factors that help determine business sustainability. Chapter III discusses government industrial policy and the role of government policy in the defense industry. Chapter IV provides an analysis of government industrial policies in the defense industry and reviews the implementation of these policies in several countries that export and import defense articles. It also compares the benefits and costs of various government industrial policies. Chapter V presents the results of the analysis and outlines government industrial policies that might contribute to a sustainable and profitable defense industry. It also recognizes the benefits and costs of the implemented policies and provides some recommendations for future research and policy implementation.

II. REVIEW OF THE DEFENSE INDUSTRY AND BUSINESS SUSTAINABILITY

According to the SIPRI, there is no exact definition of the *defense industry*; in fact, there is no standard industrial classification (SIC) of the defense industry. Based on a study of the literature, several commonalities can be used to identify the defense industry. The defense industry is a strategic industry for a country and is composed of several forms of ownership, such as a company owned by the state, a company owned by private shareholders, or private companies with a dominant share controlled by the government (Gansler, 1980). The products are in the form of defense equipment, maintenance, and repair services, and are either produced/sold alone or in combination, and are used primarily for national defense. Therefore, the defense industry, also called the *military industry*, is made up of government and commercial companies engaged in research, development, production, and service of equipment and military facilities (Kertofati, 2012). The defense industry is a dynamic business that changes constantly to adapt to the ever-changing global situation. The defense industry continues to grow in importance as domestic and global situations change in terms of the economic, political, and military balance of power. As it did in the era before World War II, the Cold War era, and the era after the Cold War, the defense industry continues to adjust to ensure sustainability and profitability in the 21st century (Dunne, 2009).

A. FIVE FACTORS IMPACTING THE GLOBAL DEFENSE INDUSTRY

Various studies have been conducted to examine how well the defense industry is able to maintain profitability during its growth and become a sustainable business. These studies concluded that there are five basic factors that play a role in the development of the defense industry worldwide:

1. The hierarchical nature of the global process of armaments production.
2. The impact of military spending on the defense industry.
3. The effect of the international arms trade.
4. The process of defense-industrial globalization.
5. The emerging information technologies–based revolution in military affairs (Bitzinger, 2009).

These five factors are further discussed to gain insights into the development of the defense industry.

1. The Hierarchical Nature of the Global Process of Armaments Production

The defense industry is a business that often requires innovation and that controls or pioneers new technology to become a leader in the production of weapons until another technology is invented. In the defense industry, competition often creates a condition where the winner takes all. The conditions of competition, and differential mastery of technology and business continuity, create tiers in the defense industry. Experts have classified countries into several tiers:

- Critical innovators, the highest tier, consist of countries that become pioneers in the technology of arms suppliers in the defense industry.
- Adapters and modifiers refer to countries that adapt and modify the technology founded by critical-innovator countries and integrate the technology in their defense-industry products.
- Copiers and reproducers is the tier for countries that copy and reproduce the technology from critical-innovator countries without conducting further improvements to the technology (Bitzinger, 2009).

These tiers naturally create a hierarchy within arms-producing states. The first and second tiers are dominant in the global defense industry. It means that every change in these countries will have a tremendous effect on other defense industry businesses. The differences between these tiers are autonomy/independence, capital, and government influence. The first tier is more sustainable, earning large revenues (or receiving big budgets), needed to keep a leading position in new technology. Less government influence offers a greater advantage when companies compete in global markets. The second and third tiers are more vulnerable to technological changes, and may be especially vulnerable when government influence is high. Therefore, government policy in these tiers could play a more substantial role.

Table 1 includes a description of the tiers experts use to categorize countries based on their defense industries.

Table 1. Defense Industry Tiers According to Several Experts (after Bitzinger, 2009)

Tiers	Experts		
	Keith Klausé (Klausé, 1992)	Andrew Ross (L. Ross, 1989)	Bitzinger (Bitzinger, R.A, 2009)
I Critical Innovator	USA, Russia	USA, Russia	USA, Russia, UK, France, Germany, Italy
II Adapter and Modifier	Western Europe	Western Europe (France, Germany, Italy, Sweden, UK), Japan, China	Australia, Czech Republic, Norway, Japan, Sweden
			Argentina, Brazil, Indonesia, Iran, Israel, Singapore, South Korea, South Africa, Taiwan, Turkey
			China, India
III Copier and Reproducer	Others	Others (Brazil, Israel, India, South Korea, Taiwan)	Egypt, Mexico, Nigeria
IV Copier and Reproducer		Mexico, Nigeria	

2. The Impact of Military Spending on the Defense Industry

Military spending has a large effect on business sustainability in the defense industry because the consumers of defense industry products are mostly governments. After the Cold War, military budgets declined and the spending was cut or redirected to domestic social uses as the so-called peace dividend. This was caused by first-tier countries, which were involved in the Cold War, reducing the size do their militaries, followed by second-tier countries (including allies of first-tier countries). Peace is bad for defense business. The contraction of the dominant countries' defense industries had a magnified impact on other global players (Dunne, 2009).

Beginning in 2000, military budgets began to rise again because of changes in the global and regional situation. Since then, in order to create a regional balance of power, many Southeast Asian countries have raised their defense budgets to provide deterrence to mitigate the risk of conflict. As an example, based on SIPRI data released in April 2014 (Abuza, 2014), although global spending on militaries declined to \$1.75 trillion in 2013, or 1.9% from 2012, the Southeast Asia region's military spending continued to increase.

This phenomenon can be explained by the regional situation in which China increased its military budget over 400% from \$40 billion in 2004 to \$188 billion in 2013. This acted as a trigger for other countries in the region to increase their military budgets, partly because territorial disputes over the South China Sea involve several countries in the region. Finally, global terrorism motivated many countries to prepare for unpredictable situations. After the 9/11 tragedy in the United States, the U.S. government raised its military budget significantly to combat terrorism in the world, and so did their allies in the North Atlantic Treaty Organization (NATO) to contribute to the fight against terrorism. These government policies had a significant impact in influencing the development of the global defense industry (Global Issues, 2013).

3. Effects of the International Arms Trade and Barriers to Entry

After the Cold War era, a drastic reduction in demand impacted the global defense industry as governments reduced the size of their militaries. The defense industry had to adjust its business strategy in order to maintain its existence and create sustainable businesses. Previously, their production was primarily for domestic government use, but along with global changes, some defense businesses discovered new markets, especially for international trade, which created new demand for their products (Dunne, 2009).

The defense industry is in a special category of businesses because entering this business is not easy. According to Gansler (1980), there are 13 factors that act as barriers to entry, preventing new companies from entering this business:

a. Marketing Problems

Because the customer for this business is the government, an extremely diverse and dynamic organization with rapid change in personnel, it requires a deeper understanding of the way governments do business. Extremely talented individuals with great marketing

resources are necessary. For a new company, it is not easy to adapt to these unique marketplaces (Gansler, 1980).

b. Inelastic Demand

The demand in this market is defined by the budget and the number of troops. There is no assurance that the government will buy the product, and significant capital expenditures are needed to produce equipment and achieve economies of scale. These factors are a big burden for a new company (Gansler, 1980).

c. Brand Loyalty

When users are already familiar and satisfied with a certain defense company's products, they get locked into a supplier, unwilling to take chances on new suppliers (Gansler, 1980).

d. Demand for Higher Performance

Defense equipment contracts often focus more on the improved performance of a product, than the price. Improving on another company's products is a challenge for new firms in the industry (Gansler, 1980).

e. Need for Engineering and Scientific Capability

In major defense procurements, the process starts at the research and development (R&D) phase. If the result conforms to the requirements, then the process continues to the production phase. To join this business, a company needs to be capable of doing R&D, as well as engineering (Gansler, 1980).

f. Existence of Expensive, Specialized Equipment

Producing defense articles sometimes requires very specialized equipment, which is costly, especially for a new company. A government policy may provide this equipment only for certain companies in which they have an interest, creating unfair competition (Gansler, 1980).

g. Need for Capital

Building a company, especially for the defense industry, is costly. To obtain capital, a company needs access to financial markets. Unfortunately, high risks and unstable defense markets make for bad appraisals for a defense company, and relatively few financial institutions are likely to provide a new company with funding (Gansler, 1980).

h. Reporting and Other Overhead Requirements

In the defense industry, government policy often requires extensive reporting requirements. The unique and costly government reporting standards can act as a barrier to entry, requiring extensive background and experience (Gansler, 1980).

i. Market Environment

In the defense industry, government policy sometimes involves the preservation of certain companies to guarantee (excess) capacity to reduce the risk of shortages and/or to ensure surge capability in time of conflicts. However, this can exclude and discourage newcomers from entering this business (Gansler, 1980).

j. Political Considerations

The defense industry is always influenced by politics. Government policies may be reflected in laws that regulate the number of companies that produce the same product in the country, or that favor certain companies at the expense of others (Gansler, 1980).

k. Federal Regulations

Government policy results in rules and regulations to protect the the defense industry. However, this action creates a barrier for other companies, especially private companies, that want to enter this industry (Gansler, 1980).

l. Security Clearance

In the defense industry, most employees have security clearances; the facilities themselves should be clear and secure, which also takes time and money and raises the costs to a new company (Gansler, 1980).

m. Social Stigma

There is a stigma about the defense industry with critics alleging that these companies, because they are involved with war and other non-peaceful activities, are responsible for human suffering. Any new company must acknowledge and be comfortable with resolving this moral dilemma (Gansler, 1980).

These barriers create potential problems, and mainly benefit the first tier of arms-producing countries. Being in a lead position in this industry creates a variety of opportunities for them in international trade relations with second- and third-tier countries. Many developing countries tend to procure their defense equipment rather than produce it,

because of the significant effort required to overcome the entry barriers to building a new defense industry (Bitzinger, 2009).

The strategy for many defense companies has changed from being domestic demand-oriented to being driven also by international demand, and defense industries now place a higher priority on international trade to expand sales and achieve economies of scale. International trade also creates a more competitive global market that tends to increase performance and reduce costs, but at the risk of arms proliferation. Motivated sellers are encouraged to enhance their R&D and develop new technologies in order to preserve their lead positions, and they may offer potential buyers incentives or offsets, such as transfers of technology, industrial participation or other unrelated offsets, joint investment opportunities, and more (Bitzinger, 2009).

Besides international sales, another strategy to adapt to smaller defense budgets is to diversify production with civilian products. Four groups are identified as taking part in this strategy, with varying success based on company sales (Brzoska, Wilke, & Wulf, 1999):

1. **Winners:** This group increases its arms sales, as well as its civilian sales.
2. **Diversifiers:** This group decreases its arms sales and increases its civilian sales.
3. **Re-armers:** This group increases its arms sales and decreases its civilian sales.
4. **Losers:** This group decreases its arms sales and decreases its civilian sales.

Out of the top 100 arms-producing companies established in 1990, by 2003 only 53 companies still existed (Bitzinger, 2009). The largest group that survived were categorized as “winners” with 25 companies, followed by “diversifiers” with 15 companies, then “re-armers” with seven companies, and finally the “losers” with only six companies. The conclusion was that diversifying to civilian production is not always successful because many complex factors are involved in the successful implementation of this alternative.

4. The Process of Defense-Industrial Globalization

Globalization has become a critical issue in the defense industry, especially for purposes of a sustainable business. Constrained military budgets and huge improvements in technology as a result of continual R&D create an intensely competitive environment.

In order to survive, companies are required to find new ways to sustain their presence in the marketplace and overcome national boundaries. Defense industry companies need to create new linkages throughout the world to adapt to this competitive environment. These linkages take such forms as subcontracting projects with other international companies in order to achieve lower production costs, engaging in joint ventures with other companies, or acquiring foreign companies to support business development. This can be accomplished if governments provide the defense industry with policies that, while recognizing national security issues, support globalization since governments, politics, and social environments can all benefit from the success of this approach (Bitzinger, 2009).

Globalization in defense technology and the industrial base affects the global arms market overall and raises concerns about security issues, including arms proliferation and changes in military doctrines, political points of view, and the shape of the domestic industrial base. Globalization can create vulnerabilities in certain countries, such that governments feel they must adopt defense industrial base policies that mitigate undesired outcomes (Bitzinger, 2009).

5. The Emerging Information Technologies-Based Revolution in Military Affairs

Continuous improvements in information systems and IT has created a revolution in military affairs, that contributes to building networks between countries and businesses. Innovation and improvements in technology have resulted in enormous changes, especially in the areas of command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR). By mastering this technology, the defense industry can create weapons that are specifically designed to increase a country's deterrence power. A goal of some defense businesses is to create new technologies that make them leaders in the defense industry. This desire for improvement may lead to a significant transformation in the global defense industry. Governments, as stakeholders in the defense industry, should define clear constraints for this revolution to ensure that national security remains the highest priority (Bitzinger, 2009).

B. THE DEFENSE INDUSTRY IN A GLOBAL ECONOMY

The last decade has seen many changes in the defense economy around the world. Some experts, including Walker and Grummet, claim that the defense industry has become an industry like any other in that it has been civilianized (as cited in Mawdsley, 2003, p. 6). According to Mawdsley (2003), the expert De Vestel (1995) identified four arguments in favor of this hypothesis. First, the internationalization of defense industries has meant that some firms have moved away from operating within a national framework. Secondly, equally neo-liberal economic policies have an impact, to a greater or lesser extent, on national defense markets, introducing competition and free markets and constraining government ownership. Thirdly, it is less clear where the boundary between civilian and defense technology lies, or which is benefiting from which. Finally, De Vestel (1995) points out that post–Cold War reductions in European procurement budgets removed the safety net from the environment in which defense firms operated.

This situation has motivated governments to take action in order to hedge against emergency situations where the governments might need the capacity of domestic companies to defend their countries. To maintain excess capacity for strategic hedging reasons, governments often provide regular procurement contracts every year just to maintain a company's production capabilities. This action is usually not efficient because the scale of production is below the companies' break-even cost, meaning they do not make a profit from their production. This, in turn, requires a government policy to subsidize these companies to keep them in business. Many other policies are imposed by governments to preserve the capability and capacity of key industries, from tailoring the procurement process, to providing capital infusions or other assets to keep those companies in business (Eland, 2001).

Other experts claim defense firms are significantly different from normal firms. The demand side is the reason behind this belief because governments are often the primary customers. Governments not only act as buyers, but they also regulate the market. By using their power as the primary customer, they determine all major features of national defense industries, such as its size, structure, ownership, location, conduct, and performance (Hartley, 2015). Mawdsley (2003) also states that governments maintain their primary

customer role for domestic defense firms when they restrict export opportunities to avoid the dangers of arms proliferation.

Thus, the defense industry is different from general industry. According to defense economists Todd Sandler and Keith Hartley, the defense industry is characterized by “non-competitive cost-based contracts, state-funded R&D, a protected market, guaranteed profits, and a culture of dependency rather than a culture of enterprise” (Sandler & Hartley, 1995). The first four characteristics reflect government policies, the last reflects a possible cost of such policies.

Governments hope that by supporting a defense industrial base they can also provide positive benefits for the country beyond the security sector, such as:

(1) Financial Benefits

Defense industrial activity can produce military equipment that provides value added to basic inputs that otherwise might be sold at lower prices. This has the potential to yield a greater profit than simply selling raw materials. For example, electronic components are much more expensive when they are sold together as a weapon control console compared with when they are sold as individual diodes, resistors, and so forth (Bitzinger, 2009).

(2) Employment Opportunities

The defense industry is usually a major industry because of the complexity of the equipment and materials used, the scope of work, and the high technology applied. This kind of industry requires highly educated human resources. As another consideration, the large number of components required in manufacturing military articles yields business opportunities for supporting sub-contractors and component industries. The existence of these industries provides employment opportunities for a variety of professionals (Sandler & Hartley, 1995). Job creation can create prosperity and increase the general welfare. However, the government faces the reality that to develop this industry, people have to acquire technical skills and become professionals. To help them acquire these skills, governments must also consider providing advanced education; otherwise, the eligible labor pool and the lack of professional workers, will result in high salaries for a few

qualified workers, and limit the potential of domestic defense companies. Some defense Industries try to overcome this problem by making their own investments in human resources. They dedicate funding to train their employees, converting them from unskilled workers to professionals, and use work contract agreements to keep those they have formed.

(3) Exchequer Contribution

Hartley (2015) mentions the exchequer contribution as one benefit of a domestic defense industry. The exchequer contribution could be in the form of tax receipts from home and overseas sales, such as income taxes, corporate taxes, as well as avoiding unemployment pay (if workers are able to stay with the company when projects are cancelled), (Hartley, 2015).

(4) Opportunity to Obtain and Develop Cutting-Edge Technology

Military equipment often relies on the latest technology. The existence of a defense industry provides an opportunity to master these technologies (Bitzinger, 2009). To compete with others, a firm will often try to develop the technology to build better products.

It is sometimes possible for military technology to be spun off and used in other industries. For example, cryptography previously was reserved for military and security services and is now being implemented in civilian products. The development of valuable technologies can allow other industrial sectors to have competitive products that compete effectively with other companies, both domestically and abroad (Dunne, 2009).

C. SUSTAINABLE BUSINESS STRATEGIES IN THE DEFENSE INDUSTRY

After reviewing factors that influence the development of and changes to the defense industry, how can the defense industry implement long-term strategies to reach and maintain sustainability? In order to do so, defense companies attempt to achieve an appropriate balance between autonomy/independence and influence in the face of government policies.

Keith Klause, Andrew Ross, and Richard Bitzinger, experts on the defense industry, have grouped countries with defense equipment manufacturers into three major categories

they call the hierarchical defense industry (Bitzinger, 2009). The three categories are: critical innovators, adapters and modifiers, and copiers and reproducers. These groupings are based on the ability of the defense industry to maintain its productivity continuously as a result of a successfully implemented strategic plan. The less the defense industry is government-subsidized, the less protection it receives from the government and the more autonomy/independence it has in implementing a strategic plan, the more likely the defense industry will be sustainable and ready to compete globally. At the lowest level, countries may assist in meeting the basic needs for defense with high government involvement in financing and protection policies. At the highest level, the defense industry can fulfill all the country's defense article needs and compete globally in the open market with minimal government involvement (Bitzinger, 2009).

Changes in the global situation have been pushing the defense industry to adjust its concentration and structure and implement new corporate strategies. This adjustment started in the Cold War era and continued into the post-Cold War era. Many countries struggle to make their defense industries sustainable. Defense industries have had to radically adjust their approaches following dramatic shifts in global demand. For example, in the early 1990s, when the Cold War ended, many countries in the world reduced their military budgets. Conversely, the 9/11 attacks in 2001 made countries more concerned about their defense against terrorism. Since 2001 the U.S increased their defense budget by 59%, and U.S spending on procurement and R&D more than doubled in fiscal year 2000 through fiscal year 2008. The U.S. campaign against terrorism, accompanied by many NATO countries joining the effort through first-ever invocation of NATO Treaty Article V, had a tremendous effect on raising military budgets all over the world (Bitzinger, 2009). In contrast, the global economic crisis in 2008 pushed countries to reduce military budgets. In 2013, another big change in the defense industry occurred as shown by the number of top 100 defense industrial companies around the world reported by SIPRI, as seen in Table 2 and Figure 1.

Table 2. The Numbers of Arms-Producing Companies by Country and Total Sales in 2002, 2003, and 2013 (current U.S. dollars in millions; after SIPRI, 2014)

Country/ Region	2002		2003		2013	
	# Company	Total Sales	# Company	Total Sales	# Company	Total Sales
USA	47	\$623,680	47	\$468,908	43	\$814,809
Western Europe	37	\$725,386	37	\$353,025	33	\$404,233
United Kingdom	12	\$303,314	12	\$50,251	9	\$85,569
France	9	\$37,352	10	\$37,640	10	\$78,213
Trans-European	2	\$29,822	2	\$36,719	4	\$124,147
Italy	5	\$170,544	4	\$14,766	6	\$38,847
Germany	9	\$184,354	9	\$213,649	4	\$77,457
Other Europe	5	\$5,485	7	\$75,068	6	\$11,445
Russia	4	\$2,407	6	\$4,617	14	\$48,251
Japan	6	\$234,981	5	\$110,388	4	\$121,232
Israel	5	\$105,258	4	\$4,110	3	\$8,565
India	3	\$47,772	3	\$58,352	3	\$5,554
Canada	2	\$720	1	\$780	1	\$2,053
Others	5	\$4,180	6	\$5,364	11	\$33,202
South Korea	2	\$1,908	2	\$2,126	5	\$16,594
Singapore	1	\$1,463	1	\$1,618	1	\$5,302
Turkey	0	\$0	0	\$0	1	\$1,140
Australia	1	\$394	2	\$1,033	2	\$1,970
Ukraine	0	\$0	0	\$0	1	\$1,871
South Africa	1	\$415	1	\$587	0	\$0
Brazil	0	\$0	0	\$0	1	\$6,325
Total	114	\$2,475,255	116	\$1,433,637	118	\$1,853,577

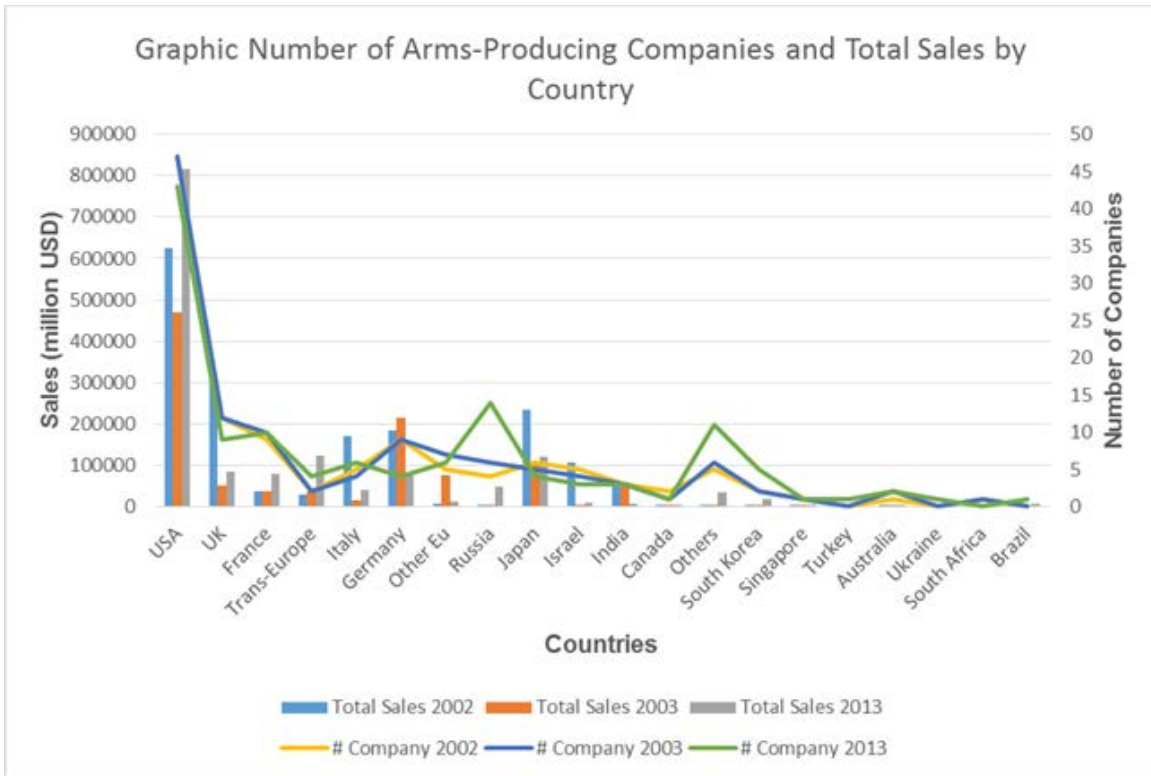


Figure 1. Graphic Number of Arms-Producing Companies by Country and Total Sales in 2002, 2003, and 2013

Table 2 and Figure 1 show that the United States and Western European countries are still leaders in the business of defense and have proven that certain strategies, successfully implemented, can sustain their defense industries. The United States and Western Europe have proven that they are in the first tier of the defense industry hierarchy. Achieving this involves many factors, including political, environmental, and economic factors, both domestic and global. They have succeeded in maintaining the highest levels of sustainability in their defense industries.

Other countries may not be leaders like the United States and Western Europe in this hierarchy, but they have made tremendous efforts. This effort has paid off, because while at first these countries were not able to produce their own defense articles, they slowly climbed from the lowest level of sustainability to the next level, thereby achieving their position in the top 100 defense industries list. Examples of these countries include South Korea, Turkey, and Ukraine. Government involvement is a big factor in their success stories because the defense industry played a significant role in national security and

sovereignty. Governments develop policies to sustain their defense industries; therefore, this project analyzes various policies governments have undertaken, as well as the costs and benefits of those policies.

D. SUMMARY

Situational (budget and threat environment) changes that defense industries experienced during the Cold War era, and today in the post–Cold War era have forced defense industries to adjust their focus of production, their company structure, and their company business strategy in order to survive and remain sustainable businesses. Changes in the political situation, such as war beginning or ending or any tension between countries, influence the defense industry as well as the domestic situation, such as the defense budget, which fluctuates depending on economic growth and a country’s priorities. The global economy has also brought about significant opportunities and challenges and changed the way defense industries run their businesses.

Dynamic change needs to be made wisely by the defense industry, and government policies are one of those changes. To help the defense industry survive, governments establish policies that can either support their defense industry or that can become barriers for improvement. Several countries have proven their ability to adapt to these changes and have become leaders in the global defense industry. Other countries have been able to preserve their defense industries, but not at the top of the defense industry hierarchy. Therefore, it is useful to further identify and analyze constructive and destructive policies: Which tend to support and benefit industry, and which tend to undermine defense industry development? What are the costs of such policies, and what are the benefits?

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III. A REVIEW OF GOVERNMENT INDUSTRIAL POLICY

A policy approach involves a comprehensive set of policy instruments unified by an underlying principle. This research addresses the principle of *industrial policy*. Different organizations and experts have different views and interpretations of industrial policy. For example, the United Nations Conference on Trade and Development (UNCTAD) defines industrial policy as a “concerted, focused, conscious effort on the part of government to encourage and promote a specific industry or sector with an array of policy tools” (Donor Committee for Enterprise Development’s (DCED’s) *Private Sector Development Synthesis Note: Industrial Policy*, DCED, 2014, p. 1). The World Bank considers industrial policy to be “government efforts to alter industrial structure to promote productivity-based growth” (Bora, Lloyd, & Pangestu, 1999). Generally, it can be stated that industrial policy involves government action in an attempt to promote and encourage its industries.

Industrial policy can appear in many forms. This ranges from encouraging competition, to tariff and trade policy (protection), to tax relief, to subsidies of various forms, to export processing zones, to state ownership of industry (Robinson, 2009). Countries adopt many different approaches to industrial policy.

A. GOVERNMENT OBJECTIVES FOR THE DEFENSE INDUSTRY

The primary objective of a nation’s defense spending is to provide its military forces, in a timely and economical way, with equipment and services of a quality and quantity that are sufficient for them to undertake the roles assigned to them by the government (Kane, 2009). This statement can be broken down into several explanations of the reasons for military combat equipment purchases.

(1) To Improve Military Power

Success in war is closely correlated with the training of military personnel and the quality of their equipment. The quantity and quality of military equipment greatly affects the calculation of combat strength. In a lesson learned from World War II, Churchill emphasized that, despite a clearly stated policy to maintain air superiority over any threatening European power, the British government failed to resource that policy in the

face of rapidly increasing German aircraft production (Dunn, 2014). Sophisticated military equipment is not an absolute guarantee of victory in battle because it all depends on the man behind the gun and the operational theatre. The Vietnam War provides an example where combat forces equipped with sophisticated weapons still found it difficult to defeat North Vietnamese forces partly due to a lack of understanding of the theatre of conflict (Hamilton, n.d.).

(2) To Maintain a Country's Sovereignty

The primary duty of military forces is to preserve their country's sovereignty. This includes defending the country from aggression and potential occupation by other countries (Edelstein, 2004). With improvements in the technology and sophistication of armaments, the threat environment requires new investments. For example, today the threat environment is not only physical, but also cyber, and quality improvements in armaments now mean that precise "intelligent" munitions can replace multiple "dumb" bombs from the past.

Military forces need defense articles that are specifically designed to engage in the type of conflict they may encounter (Dunn, 2014). For example, countries that have a vast sea area require warships to patrol their waters, and not only standard patrol ships, but other types of warships as well, such as destroyers, frigates, and corvettes, to support a strategy to maintain military power balance in a regional area. In addition, fighter aircraft are needed to intercept intruders that might enter the airspace of a country without permission, or to maintain a policy of air superiority.

(3) To Prepare for War

Nobody knows when or where the next conflict will take place. After the Cold War ended with the breakup of the Soviet Union, it seemed there would no longer be a threat of war in the world. Many countries were optimistic about a lasting peace. So who would have predicted that Iraq would suddenly invade Kuwait on August 2, 1990? This attack ultimately triggered the first Gulf War (Persian Gulf War, n.d.). Today the world is riveted by the chaos that began in Syria in 2011 (Syrian Civil War, n.d.). As with Iraq's invasion of Kuwait, this event happened without prior prediction.

These two examples of unexpected wars provide evidence that peace can turn into war at any moment. There is no guarantee peace will last forever. Conflicts that were initially modest and local might spread and turn into wars that threaten a country's sovereignty (Edelstein, 2004). Therefore, military forces in every country attempt to prepare themselves against any unwanted conflicts that may happen unexpectedly. Thus, military forces should have the capability to deter conflict and defend the country (Biddle, 2010).

(4) To Participate in International Strategic Issues

Participating in international strategic issues is one way to demonstrate countries' interest and credibility on the world stage. Examples include participation in the United Nations program for maintaining world peace by sending troops as members of peacekeeping or peace enforcement forces, and carrying out joint exercises to strengthen cooperation between countries.

In addition to understanding the reasons for maintaining military forces, it is also imperative to understand how countries decide to supply their forces. In order to acquire military equipment, governments have two choices: To *make* their own military equipment through a government organization or state-owned company, or to *buy* equipment from private firms. Because of high costs and high capital investments only a few countries are currently implementing policies to build their own military equipment. In addition, limited expertise of human resources provides another barrier. Most governments purchase equipment from either domestic firms or foreign firms and may use offset agreements to require domestic co-production or licensed domestic production when purchasing from foreign companies (Ianakiev & Mladenov, 2009).

Many countries attempt to shape the capacity of their domestic defense industries. Among the reasons countries want to have a capable defense industry are:

(1) Supplying and Equipping Forces

Military forces require suitable combat-ready equipment. This requirement does not end with governments' purchase of that equipment. The availability of spare parts is critical to support operations and maintenance. The existence of a domestic defense industry with the capability of manufacturing both combat equipment and spare parts can provide valuable support for combat readiness (Sandler & Hartley, 1995).

(2) Defense Capability

Well-developed defense industries that produce sophisticated arms can provide a decisive advantage over an enemy. In 2013, the SIPRI stated that there were 43 arms-producing companies in the United States, which provided the U.S. superior combat capability (SIPRI, 2014).

(3) Strategic Influence

Having a world-class defense industry can give a country greater political and military influence, larger stature in alliances, and greater opportunity to enter collaborative programs and markets. When people hear about a world-class defense industry, what comes to mind is the mastery of sophisticated, high-technology equipment. Part of the strategic value of a country's defense industry is the deterrence effect it provides. Potential aggressors may be more likely to reconsider engaging in disputes. Political and military influence increases when a country's industry masters advanced technology allowing companies to enter and compete in the global marketplace. In addition, an advanced defense industry can attract foreign companies and foreign investment. (Kane, 2009).

(4) Independence of Military Equipment Support

Domestic production of military equipment reduces a country's dependency on other countries (Sandler & Hartley, 1995). Dependence on an exporter country for military equipment can undermine military capability of the importer country if an exporter country applies embargoes on critical armaments or materiel. The importer country's force might find itself with limited availability of spare parts. When the spare parts inventory runs out, operational readiness collapses.

Another risk that endangers operational availability is bankruptcy. When the original manufacturer experiences bankruptcy or stops production and can no longer supply necessary equipment or supplies, the operational readiness of the importer country will suffer once the spare parts run out.

The risks of dependency can be minimized if a country's domestic defense industry is capable of providing equipment, supplies and other support. However, the cost of this insurance is often substantial. For example, Indonesia tried to support its military aircraft by producing CN-235 as a joint production agreement between its state-owned companies (Industri Pesawat Terbang Nusantara [IPTN]) with Casa Spain. But the cost to build each CN-235 turned out to be significantly more expensive than to build a C-295, an equivalent aircraft made by the foreign company, Casa. The CN-235 costs USD \$34 million (Deagal, 2015b), while the C-295 costs only USD \$22 million, an \$11million insurance premium per aircraft (Deagal, 2015a).

(5) Competition in the Global Marketplace

One objective of a country's defense industry is to supply the needs of its military (Sandler & Hartley, 1995); however, in some cases, companies in that industry are capable of becoming global sellers of military equipment. The country carries out military equipment procurement up to a certain quantity, and may decide not to continue purchasing the equipment by the time the contract is completed. In this case, the manufacturer may have an opportunity to sell its military equipment to other countries. The industry might seize the opportunity to sell to foreign buyers to maintain its revenues and pay the salaries of its employees. If the company's military equipment is accepted in the global marketplace and purchased in significant quantities, the company can take advantage of economies of scale and learning curves to lower costs and boost profits.

B. GOVERNMENT INDUSTRIAL POLICIES FOR THE DEFENSE INDUSTRY

The main goals of defense industrial policies generally are to develop domestic production capabilities while also building industrial infrastructures and generating

employment in the home country. Ideally, a successful industrial policy ensures that industry does not rely solely on domestic government purchases.

Industrial policies in the private sector are not new. For example, most governments grant investment subsidies and special tax credits to foster employment and increase productive investment, particularly in struggling business areas. But the consensus among economists is that defense industrial policy is a mistake if government programs simply finance activities that firms would have undertaken anyway in the absence of the industrial policy. Taxpayer money would simply be wasted (Chriscuolo, Martin, Overman, & Reenon, 2012).

Government policies in supporting the defense industry can take many forms and can differ greatly among countries. A government may facilitate information dissemination, coordination, and the development and retention of technical skills. Governments can promote specific firms internationally, or simply provide a forum where small firms (sub-contractors) can coordinate with prime contractors. Many governments provide special assistance to their small and medium-sized enterprises (SMEs) that would normally find it difficult to participate in global supply chains. Governments can also use targeted procurement to support export development. Boosting the scale of production of a domestic firm, and thus lowering its average costs, may help firms achieve economies of scale that allows them to become internationally competitive.

Every country has a different approach to its defense industrial policy. Berkok et al. (2012) discusses six general focus areas that multiple countries use to shape their industrial policies. These areas are: 1) policies that improve coordination between government and the defense industry, 2) policies that encourage and support research, 3) policies targeted to support small and medium enterprises (SMEs), 4) policies that help firms access global supply chains, 5) policies that create a pro-competitive environment, and 6) offset policies. A discussion of each appears below:

1. Policies That Improve Coordination between Government and the Defense Industry

Coordination between the government and the defense industry is very important. The market for specialized military equipment is different from the market for other goods

because of their highly differentiated nature and basic function, which means they are not easily available (Berkok et al., 2012). Therefore, governments can encounter obstacles in procuring specialized military equipment. These obstacles can lead to serious budget problems because of high prices, lengthy delivery dates, and difficulties in companies complying with specifications.

The defense industry has problems maintaining its sustainability when sporadic orders and unique requirements, make it difficult for companies to manage resources such as capital, and labor (Berkok et al., 2012). Although the defense industry's problems cannot be totally eliminated, they can be reduced by increasing coordination between the government and industry. Coordination between the government and industry might include military equipment maintenance projects to sustain industry when there is a slowdown in new production contracts. Some governments choose an import substitution policy that favors domestic production to prioritize purchases from domestic firms. As a result, the company is sheltered from foreign competition and government orders are guaranteed to flow to protected companies (Berkok et al., 2012).

However, the government has to be cautious in imposing an import substitution policy. Lack of competition will result in governments paying higher prices for fewer, and lower quality, products and services. This policy is supposed to be temporary, allowing time for the defense industry to invest in new plant and equipment, train its employees, and increase productivity to compete with foreign defense industries. In the meantime, there is a risk the domestic industry may fall behind since foreign companies are a valuable source of learning and knowledge (Bruton, 1989). Applying an import substitution policy across too long a period of time would undermine the benefits of competition, and ultimately lead to monopoly power. Worse yet, it risks government capture, where a company decides to invest in politicians (legal lobbying or corruption) to preserve its market power, instead of investing in its plant, equipment and people to compete successfully in global markets.

2. Policies That Encourage and Support Research

The importance of military force superiority motivates all countries to create the best possible combat technology. Therefore, military technology evolves and changes quickly. Countries that invest bigger budgets for the development of the latest technologies

tend to lead this competition. The company that has a lead in technology development can more easily penetrate the global marketplace (Bitzinger, 2009).

Figure 2 illustrates defense R&D spending by tier I and II countries, excluding Russia. The United States, as the biggest exporter of arms, spends the most on R&D and dominates global sales. In 2013, the U.S. spending on R&D in defense sector was 53 % of global R&D spending (OECD, 2015) The UK and France, although spending less on R&D than the United States, also invests significant sums to sustain their arms exports. By allocating substantial funds for R&D, these countries can be categorized as critical innovator countries that are on the frontiers of defense technology and deliver cutting-edge technology, thus making them dominant arms suppliers.

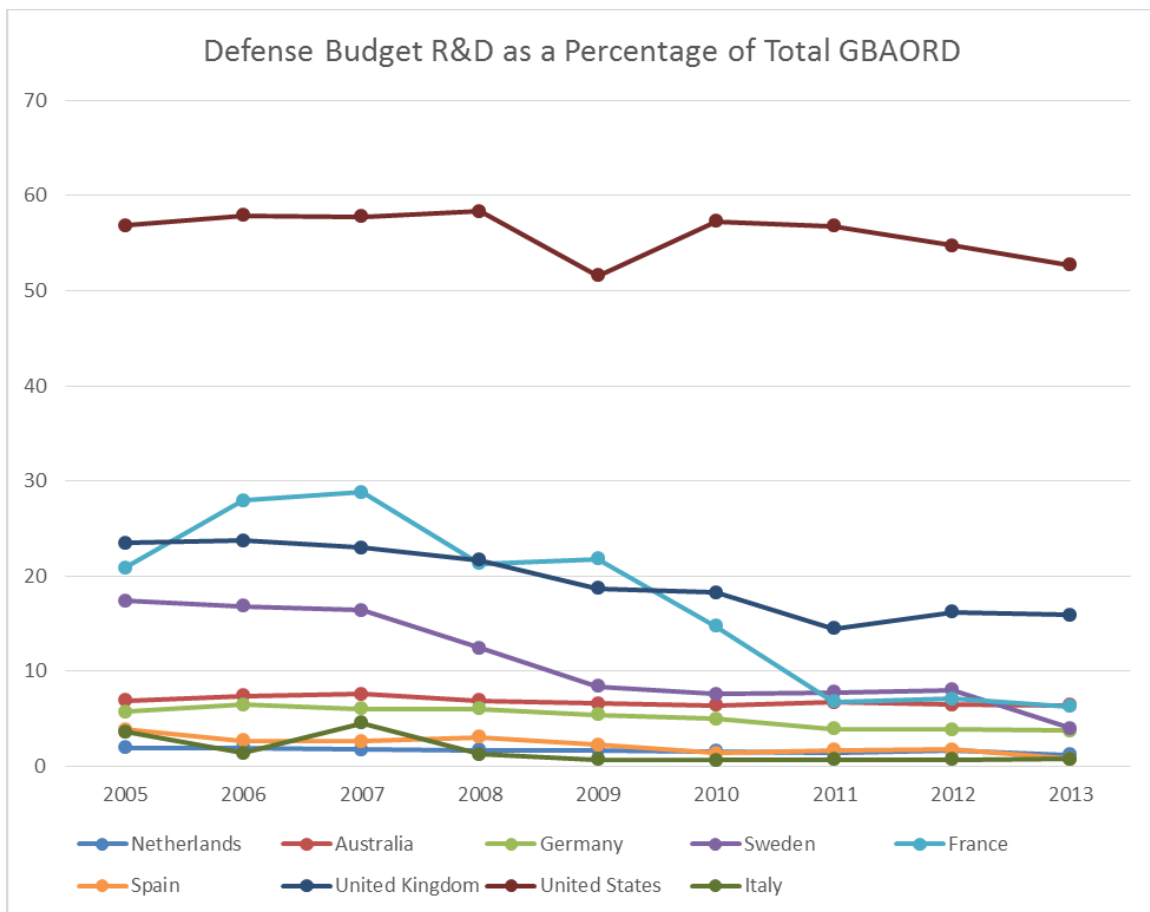


Figure 2. Defense Budget Research and Development Graph as a Percentage of Total Government Budget Appropriation or Outlays for Research and Development (GBAORD; from Organization for Economic Co-Operation and Development [OECD], 2015)

Technology developed in the military field is sometimes also useful in other fields. The development of state-of-the-art technology can yield large orders and earn a place for companies in global supply chains.

Investment in state-of-the-art technologies can also be facilitated by an import substitution policy which allows the domestic industry to invest in R&D to compete globally. Investments in R&D can serve as an export promotion tool when the industry develops competitive products (Bruton, 1989). But this import substitution policy is also subject to all of the same risks discussed earlier.

3. Policies Targeted to Support Enterprises with a Global Comparative Advantage

Many countries recognize that mastering all technological capabilities is no longer possible. R&D around the world quickly improves upon new technologies and makes previous technologies obsolete. Thus, investing in all areas of technology would cost too much and be inefficient (Kapstein, 2009).

Countries have limited their defense investments, making educated guesses about areas of excellence that might improve their comparative advantage. Those countries often encourage (through subsidies, tax credits, or other policies) domestic defense firms to preserve and promote technological competencies by investing more in R&D. The goal of these policies is to increase the efficiency and effectiveness of domestic defense products making them more competitive, and capable of sustaining a position in global markets (Berkok et al., 2012).

4. Policies That Help Firms Access Global Supply Chains

Along with the end of the Cold War, cuts in military budgets in many countries have triggered a reshaping of the defense industry. There are now only a few companies that can be categorized as prime contractors. According to SIPRI Top 100 arms-producing companies, there were 53 companies that categorized as prime contractors in 1990. This number then decreased to only 25 companies that still existed and could be considered as prime contractors in 2003 (Dunne, 2009). Financial and political power makes it possible for these prime companies to restrict new entrants into the defense sector. Small companies

that lack resources and marketing capabilities compared to larger companies find it difficult to become global suppliers. But large companies may also find it difficult to sell their products internationally without support from their governments, if foreign suppliers are supported by their own governments (Berkok et al., 2012).

Some countries, like Australia, the Netherlands, and Turkey, have realized that their defense industries can be successful only if their defense companies are part of an international supply chain network (Kane, 2009). Although many countries recognize that achieving and sustaining positions in the defense market, including the international market, is primarily the industry's own responsibility, they believe government has an important role to play.

5. Policies That Create a Pro-Competitive Environment

The defense industry is the same as other sectors in that it needs a stable and predictable environment to encourage companies to invest. This includes a stable political environment, favorable economic conditions, secure property rights, and rule of law. Regulatory policy must also support investment, avoiding complex, and burdensome regulations (Revia, 2014). Barriers to entry must be also be low to reap the benefits of competition (Robinson, 2009).

Defense industries are often very technical, and as such, require a technically skilled labor force. A country that wishes to develop a domestic defense industry must be willing to invest in an educated workforce (Berkok et al., 2012).

6. Offset Policies

Offsets are “in-kind benefits” (e.g., goods or services) provided by a supplier to a purchasing country that offset the purchase price of the article by the foreign country (Nackman, 2011). The United Nations Commission on International Trade Law (UNCITRAL; 1993) guide categorizes offsets as a variety of countertrades. The UNCITRAL (1993) defines *countertrade* as “transactions in which one party supplies goods, services, technology or other economic value to the second party, and in return, the first party purchases from the second party an agreed amount of goods, services, technology or other economic value” (p. 5). Based on the UNCITRAL guide, offsets

normally involve the supply of goods of high value or technological sophistication and may include the transfer of technology and know-how, promotion of investments, or facilitation of access to a particular market.

There is no international standard for how offsets should work or are applied in particular procurements. Over 130 countries engage in the practice in one form or another. Each country gives offsets a different label, but the concept is widespread. In the defense arena, many countries apply offsets in order to counterbalance the loss of domestic and economic activity, or domestic capability, by ensuring some form of preservation of domestic capability or return investment in exchange for granting a foreign company exclusive rights to be a defense supplier or contractor in the applicable country (Nackman, 2011).

In practice, offsets are often complicated. The World Trade Organization (WTO) generally forbids the use of offsets in government procurement under Article 16 of the Government Procurement Agreement (GPA). Michael Czinkota and Anne Talbot argued that countertrade, of which offsets are a subdivision or, sometimes, an equivalent concept, contradicts the spirit of some of the most fundamental principles of the General Agreement on Tariffs and Trade (GATT)/WTO system: transparency, consultation, multilateralism, compensation, and “the aim to reduce trade distortions” (as cited in Ianakiev & Mladenov, 2009, p. 190). But exceptions are granted in Article 23 on account of reasons pertaining to national security and public health (Magahy, Cunha, & Pyman, 2010).

Offsets are commonly categorized as direct or indirect, as seen in Figure 3, depending on whether offset requirements tie directly or indirectly to the article being purchased.

In the case of defense purchases, direct offsets relate directly to the defense equipment or services being acquired. The goal of direct offsets is often strategic independence, such as developing related maintenance and upgrade capabilities. Indirect offsets are not linked to the acquired defense products or services. Many countries use indirect offsets as a tool for providing development opportunities in sectors other than defense (education, health care, etc.) to make defense purchases more politically attractive (Brauer & Dunne, 2004).

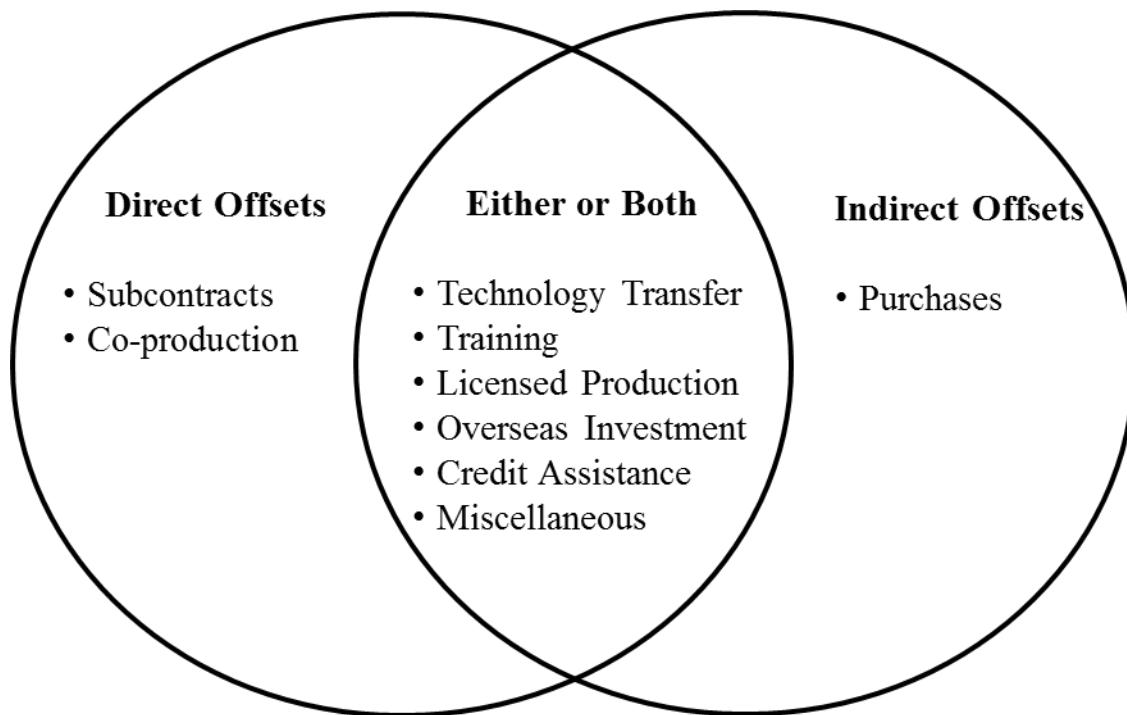


Figure 3. Classification of Offset Transaction Categories (Source: BIS, as cited in Nackman, 2011, p. 519)

There are many reasons why countries require offsets in major defense procurements. Nackman (2011) lists some of these reasons:

- to reduce the impact on the economy from losing major defense programs to foreign contractors;
- to access defense technology know-how;
- to build a domestic defense industrial base capability; and
- to preserve or improve domestic employment (p. 520).

Not all countries agree to use offsets because there is a widespread negative preconception of offsets, including arguments that they are prime instruments for corruption (Magahy et al., 2010). The United States officially stated that offsets are economically inefficient and trade distorting (U.S. Department of Commerce, Bureau of Industry and Security, 2007). Offsets are considered inefficient because the benefits of offsets are paid for in higher prices for defense equipment (Ianakiev & Mladenov, 2009). For example, Ianakev and Mladenov (2009) explain that the desire to obtain the contract may lead a foreign company to use local suppliers who are less efficient, thus inflating production costs.

C. SUMMARY

This chapter provided a general overview of the costs and benefits of government industrial policy, focusing on the defense industry. Governments establish industrial policies in an effort to promote and encourage its industries. There are a variety of government industrial policies, such as tariff protection and trade policy (e.g., import substitution), tax relief, subsidies of various forms, export processing zones, and state ownership of industry.

A sustainable defense industry can allow a country not to become too dependent on foreign military products. A sustainable, efficient and effective defense industry can also have strategic influence that grants a country greater political and military standing. Industrial policies designed to facilitate the creation of sustainable defense industries also contain serious risks. These include the creation of monopoly power, corruption, and government capture by favored domestic firms.

Every country takes different approaches in their defense industrial policy. This research covered six general policy areas that multiple countries use to develop their defense policy. These areas are policies that improve coordination between government and the defense industry, policies that encourage and support research, policies targeted to support SMEs, policies that help firms access global supply chains, policies that create a pro-competitive environment, and offset policies.

The next chapter explores government defense industrial policies in tier I, tier II, and tier III countries. The explanation of government policies in Chapter IV is based on six general policies described by Berkok (2012). There are slight differences in policies targeted to support SMEs, which are converted into policies targeted to support enterprises to develop a global comparative advantage. The next chapter also discusses costs and benefits from implementation of these policies.

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IV. EXISTING POLICIES AND THEIR COSTS AND BENEFITS IN COUNTRIES WITH A SUSTAINABLE DEFENSE INDUSTRY

The end of the Cold War had a great effect around the world. Countries began reducing their spending on arms articles, resulting in smaller orders and fewer new projects. Thus, there were job losses, manufacturing plant closures, and mergers or exits from the defense business. Mergers created new companies, such as the Boeing Group (formed from the merger of Boeing and McDonnell Douglas and the later acquisition of Rockwell) with the purpose of obtaining economies of scale (Hartley, 1997). Companies had to adjust to uncertainties in the defense industry in order to survive. They were required to invest in innovative R&D.

Governments learn from experience and therefore apply policies to support and improve their defense industries. This chapter presents policies in four countries that were chosen to represent each tier in the defense industry classification. Tier I is represented by the United States as the “critical innovator” country in weapons production, tier II is represented by the UK and France as “modifiers and adapters” in the defense industry, and tier III is represented by South Korea as an example of a “copier and reproducer” country. South Korea is the best example of a country that struggled and eventually succeeded in upgrading its classification from tier III to tier II, its current classification. These countries are analyzed on the basis of policies they have adopted from the six general policies described by Berkok (2012), as explained in Chapter III.

Implementation of any of the six policies common in the defense industry involves costs and benefits which are described in this chapter. Costs and benefits for each policy should be evaluated and compared among the six common policies in order to guide future policy or improve existing policy. There is no worst or best policy; rather, consideration is given to how to identify and recommend a policy that is suitable to the situation and needs of a country, since each country is unique.

A. THE EXISTING POLICIES

The four countries (the United States, the UK, France, and South Korea) are good representatives of each tier in the defense industry country classification as demonstrated

by sales revenues earned over several years. Table 3 provides an overview of the world's top 100 arms-producing companies located in the United States, the UK, France, and South Korea and their annual sales. Figure 4 details the sales made by the top 100 arms-producing companies that reside in the United States, the UK, France, and South Korea, and Figure 5 includes the number of top 100 companies in each of these countries.

Table 3. Number of World Top 100 Arms-Producing Companies in the United States, UK, France, and South Korea, and Their Sales (after SIPRI, 2014)

Year	US		UK		France		South Korea	
	Number of Companies	Total Sales (million US\$)	Number of Companies	Total Sales (million US\$)	Number of Companies	Total Sales (million US\$)	Number of Companies	Total Sales (million US\$)
2003	47	468,908	12	50,251	10	37,640	2	2,126
2004	50	185,950	12	33,690	9	23,080	2	970
2005	48	194,730	13	38,320	11	28,080	3	1,540
2006	48	222,290	13	41,130	9	25,610	4	2,120
2007	50	236,980	10	45,600	9	29,930	3	2,110
2008	49	261,600	12	50,850	10	31,150	2	1,520
2009	47	274,700	12	50,880	10	33,320	2	1,680
2010	47	277,940	10	49,890	10	34,100	4	3,840
2011	45	268,600	15	55,500	9	31,180	5	5,160
2012	41	252,280	14	50,600	10	30,910	4	3,790
2013	43	814,809	9	85,569	10	78,213	5	16,594

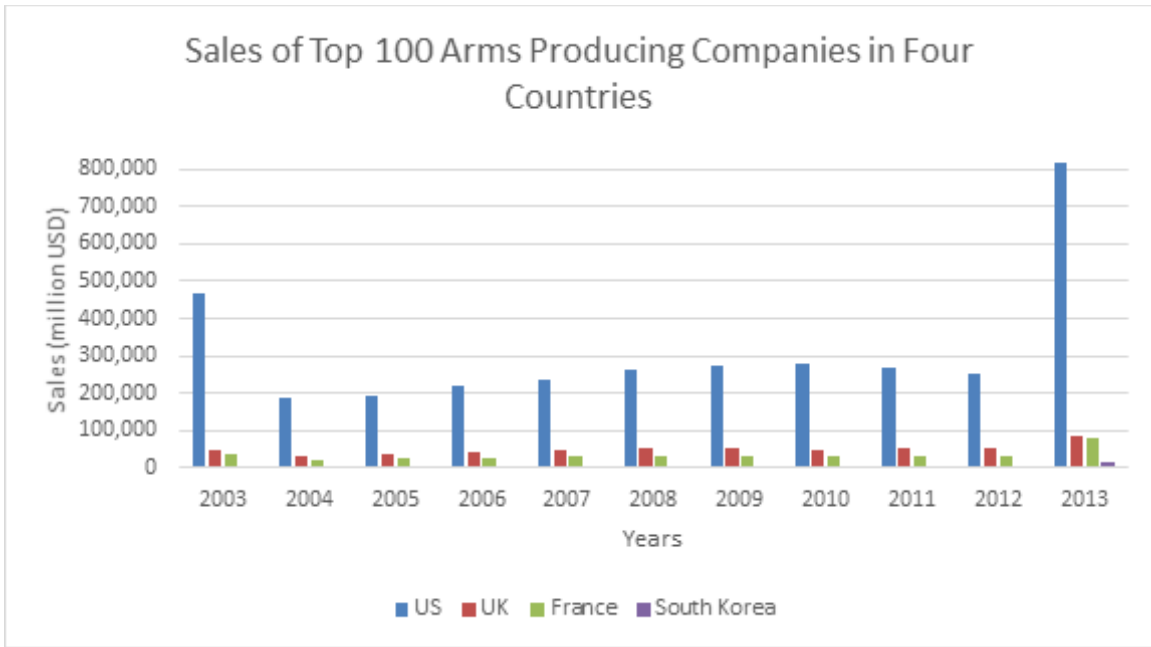


Figure 4. Sales Made by the United States, UK, France, and South Korea between 2003 and 2013 (after SIPRI, 2014)

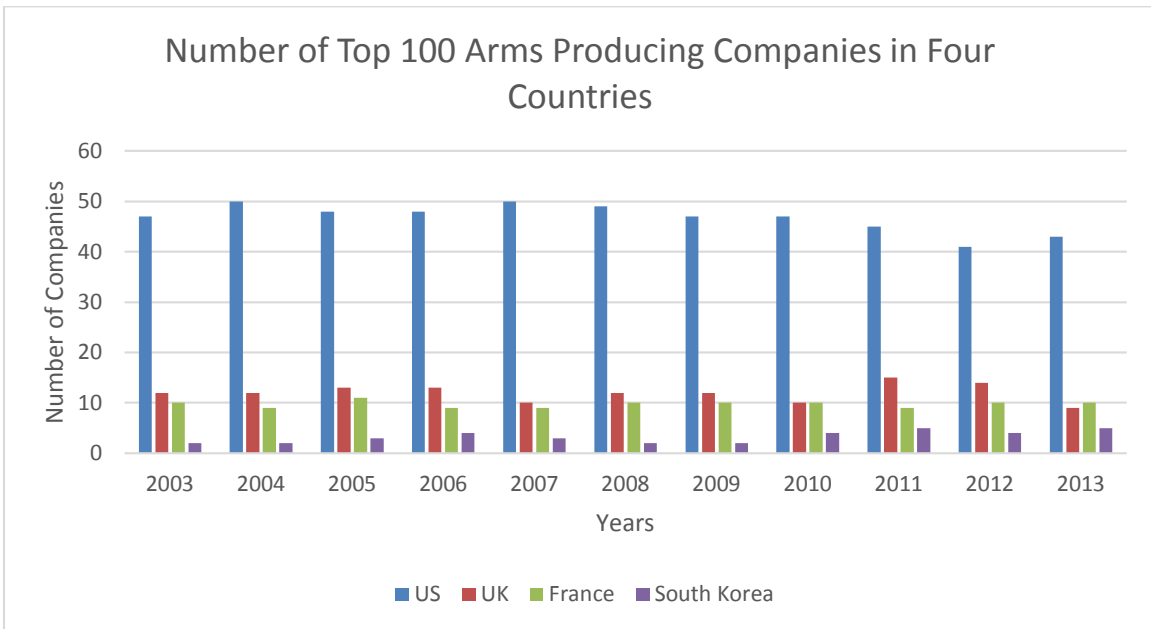


Figure 5. Number of Top 100 Arms Producing Companies in the United States, UK, France, and South Korea between 2003 and 2013 (after SIPRI, 2014)

Each country takes different approaches in implementing the six general policies in the defense industry. They adjust these policies so that they are suitable to their needs and support the achievement of their goals. The United States, a tier I country, maintains its dominance by leading in innovation. The UK, France, and South Korea try to upgrade their industries to preserve or enhance their market position. It is useful to analyze and collect information on lessons learned from implementing policies that have led to improvements in tier status.

1. Tier I: The United States

The United States is the world’s number one and largest military exporter. In 2013, sales from its defense industry were USD \$85,569 million (SIPRI, 2014). Figure 6 shows sales of U.S. companies listed in the world’s top 100 arms-producing companies based on information from the SIPRI.

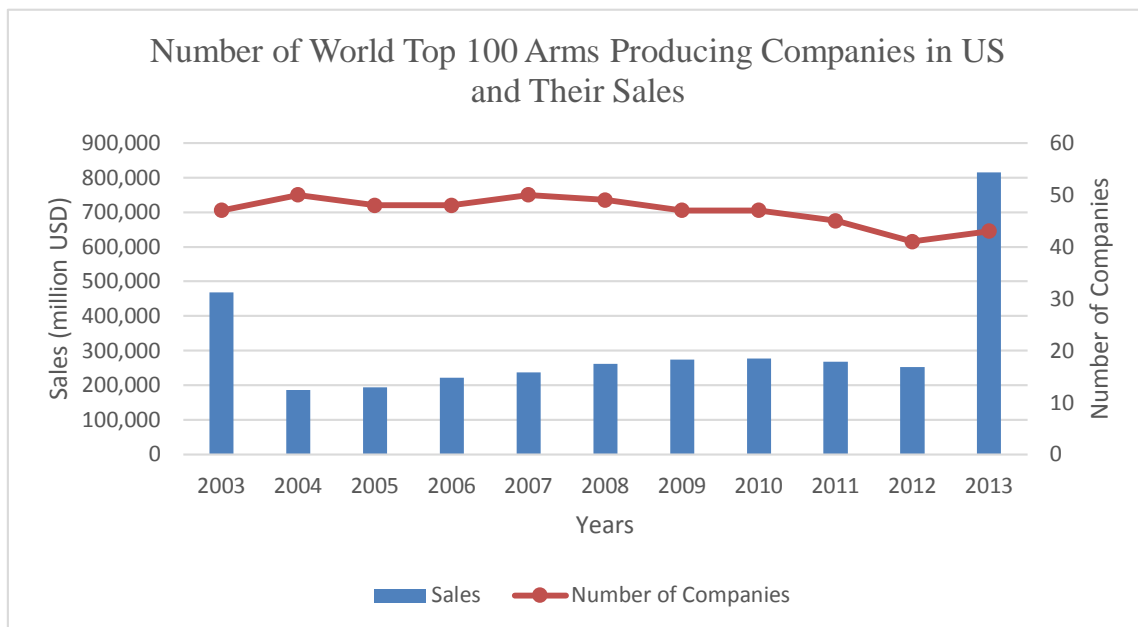


Figure 6. Number of Companies in the United States and Their Sales (after SIPRI, 2014)

The U.S. defense industry is no different from many industries that apply free-market competition. Economists believe that free-market competition leads to high quality

products that reflect consumers' tastes and preferences, and prices that reflect the marginal costs of production which tend to be driven down over time in the search for efficiency. The U.S. defense industrial strategy mostly relies on market forces and intervenes in the marketplace only when absolutely necessary to create and sustain competition, innovation, and essential industrial capabilities. Limiting competition is the fact participants are only domestic firms, along with selected firms of U.S.-allied countries that have a reciprocal relationship with the United States. U.S. defense industrial policy tends to gravitate toward an analysis of how to maintain capabilities and competition in areas within this defense-unique industrial base (Greenwalt, 2014).

As the principal customer, the Department of Defense (DOD) influences the shape of the defense industry through its research, budgets, evaluation criteria, and logistics process. But the U.S. policy for self-sufficiency in meeting its defense need sometimes has led to costly and inefficient defense-unique acquisitions and business processes (Greenwalt, 2014). The joint strike fighter program is one example of such an acquisition. In 2012, the Government Accountability Office (GAO, 2012) stated that the project was six years behind schedule, and unit costs per aircraft had doubled since the start of development in 2001.

The department's challenge is to establish, maintain, and strengthen industrial relationships that ensure that the defense industrial base is both healthy and capable (DOD, 2015). In so doing, the department must also balance the need to encourage competitive forces to control costs and spur innovation with the desire that companies combine with other firms to realize efficiencies, create integrated and more capable industrial capabilities, or eliminate excess capacity. The department's policy is explained below.

- (1) Improve Coordination between Government and the Defense Industry

Although the defense industry relies on free-market competition, politics plays a much larger role in the defense industry than it does in the market for commercial products (Eland, 2001). Thus, the DOD established the Office of Manufacturing and Industrial Base Policy (MIBP) to ensure robust, secure, resilient, and innovative industrial capabilities that can fulfill warfighter requirements (DOD, 2015).

The MIBP supports the Office of the Secretary of Defense and service acquisition executives by providing detailed analyses and in-depth understanding of the increasingly global, commercial, and financially complex industrial supply chain essential to national defense. It also recommends or takes appropriate actions to maintain the health, integrity, and technical superiority of that supply chain (DOD, 2015). The MIBP is the DOD's lead in all matters relating to mergers, acquisitions, and dissolutions of national security-related business.

(2) Policies That Encourage and Support Research

The MIBP has the Defense Innovation Marketplace program to consolidate resources for both industry and the DOD regarding the department's R&D/science and technology investment priorities, business opportunities, and engagement activities (DOD, 2015). The program provides a centralized resource for the department's acquisition, science, and technology professionals on information about the industry's independent R&D activities. The program serves as a secure portal for the industry to share its independent R&D (IR&D) projects with the DOD, thus providing visibility into these industry efforts.

Federal Acquisition Regulation (FAR) 31.205-18 regulates independent research and development (IR&D) and bid and proposal costs. IR&D is a source of potential solutions for the technology challenges of the DOD. Firms interested in the program have a right to decide which technologies to pursue, as long as these efforts are of potential interest to the DOD. IR&D is not federally funded; thus, technical data rights remain with the firm (FAR 31.205).

In supporting small business, DOD established small business innovation research (SBIR) and small business technology transfer (STTR). SBIR program was established by congress in 1982 to fund R&D by U.S. owned and operated business of less than 500 employees. The DOD accounts for more than half of federal governments' total SBIR program (SBIR, 2015)

(3) Policies Targeted to Support Enterprises With Global Comparative Advantage

The United States is well known as home to a lot of companies with global competitive advantages. Examples include companies such as Boeing and Lockheed Martin located in the United States. Basically, with their cutting-edge technology, these companies are able to compete globally with minimal intervention from the government. Also, the U.S. policy for self-sufficiency in meeting its defense needs supports the companies' survival. (Guay, 2007).

Unfortunately, not all firms in the defense industry survive. Reduction of defense budgets after the Cold War resulted in declining orders and R&D support. Thus, some firms did not survive and the others' capabilities declined. The DOD (2014) has the authority to assess industrial base capabilities to identify endangered industrial capabilities. The instruction also regulates the criteria for the assessment of endangered industrial capabilities, the means for safeguarding sensitive information, and the procedures for preserving capabilities at the program level and below. The purpose of the assessment is to ensure that the industrial capabilities needed to meet current and future national security requirements are available and affordable (DOD, 2014).

(4) Policies That Help Firms Access Global Supply Chains

The U.S. companies in the defense industry are globally competitive because of their quality and high technology products. However, the DOD has also established arrangements with several nations to ensure the mutual supply of defense goods and services. These bilateral arrangements allow the DOD to request priority delivery for DOD contracts, subcontracts, or orders from companies in these countries. Similarly, these arrangements allow the signatory nations to request priority delivery for their contracts and orders with U.S. firms (DOD, 2015). The United States has established such security of supply arrangements with seven countries: Australia, Canada, Finland, Italy, the Netherlands, Sweden, and the UK.

(5) Policies That Create a Pro-Competitive Environment

Where technological superiority on the battlefield provides a critical military advantage, competition can stimulate valuable innovation. Competition designed by the

DOD pushed General Electric and Pratt & Whitney to maximize their efforts to provide the best propulsion engine for the F-16. Based on the limited numbers of suppliers for many defense products and services, the DOD has the challenge to foster a suitable framework for competition in defense markets. The DOD believes that the competitive pressure of the marketplace is the best way to shape an industrial environment that supports the defense strategy. Therefore, the DOD intervenes in the marketplace only when necessary to maintain appropriate competition. The DOD also intervenes when it needs to develop and preserve industrial and technological capabilities essential to defense (DOD, 2012).

Sustaining a competitive environment is not easy and poses special challenges. As the defense industry evolves, the DOD has been trying to sustain effective competition balancing several factors:

- The need to sustain multiple competitors for legacy industrial capabilities is significantly different than the need to develop and maintain potential competitors able to develop product lines requiring high levels of innovation.
- Vertical integration and the resulting influence on companies' make/buy decisions, or decisions to no longer act as a merchant supplier to other firms, could impact the DOD's ability to acquire the best mix of capabilities from industry.
- As a consequence of worldwide defense industry consolidation and collaboration, the DOD must determine the effects of competition from non-U.S. defense firms on the anti-competitive risks associated with U.S. defense firm combinations.
- The DOD must also assess whether foreign firm acquisitions of U.S. defense firms will likely result in the transfer of critical technologies from the U.S. industrial landscape or present risks to supply chain reliability and integrity (DOD, 2012).

(6) Offset Policies

Unlike other nations, the U.S. government does not apply an offset policy in awarding foreign contractors domestic defense contracts, although it often applies goals for subcontracting to U.S. small businesses and a price evaluation preference under the Buy American Act (Nackman, 2011). The government views the practice of offsets as causing economic distortions in international defense trade and undermining fairness and competitiveness (Kane, 2009). However, a different approach occurs when U.S. firms agree to use offsets when they are awarded contracts from foreign countries. According to

the report *Offsets in Defense Trade, Nineteenth Study*, over the 20 year period from 1993 to 2013, 62 U.S. firms reported having signed 13,377 offset-related defense export sales contracts with a total value of \$66.7 billion with 46 countries and two multi-country arrangements (U.S. Department of Commerce, Bureau of Industry and Security, 2015). The total offset credit value was \$79.4 billion.

2. Tier II: United Kingdom and France

The next two sections provide an overview of the UK and France, which are both tier II countries.

a. United Kingdom

The UK is one of the world’s largest military exporters. In 2013, revenues earned from the defense industry were USD \$85,569 million (SIPRI, 2014). Figure 7 shows sales revenues made by UK companies listed in the world’s top 100 arms-producing companies according to the SIPRI.

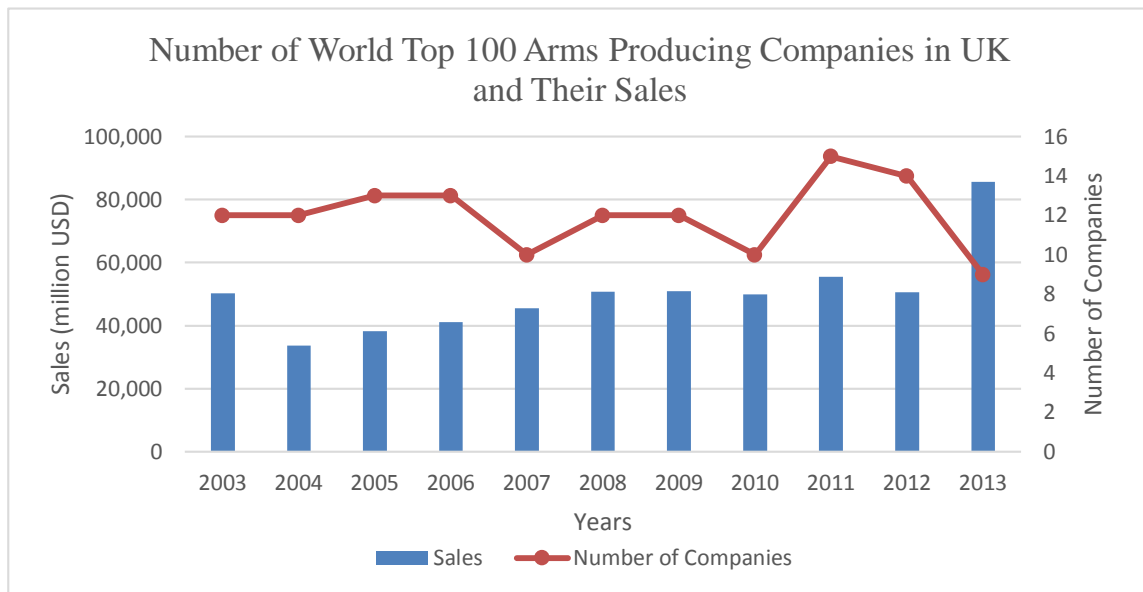


Figure 7. Number of Companies in the UK and Their Sales (after SIPRI, 2014)

The UK government established the current policy for its defense industries based on three linked documents:

- *Defense Industrial Policy (DIP)*. The DIP was released in 2002 as a joint product of the Minister of State for Defense Procurement and the Minister of State for Employment Relations, Industry, and the Regions. The DIP explicitly recognizes a thriving, innovative, and competitive defense industry as being essential for the country's defense. The document stated that the policy's objective is to enhance the competitiveness and sustainability of the UK defense industry while continuing to provide high quality equipment for its armed forces at best value for money (Kane, 2009; Ministry of Defence UK, 2002).
- *Defense Industrial Strategy (DIS)*. The DIS was released in 2005 by the Defense Secretary, Trade and Industry Secretary, Chief Secretary to the Treasury, Minister of Defense Procurement, and Minister of State for Industry and the Regions. The DIS is an implementation guide for DIP (2002), and is driven by the need to provide the UK's armed forces with the equipment they require, on time, and at best value for the taxpayer. The DIS gives a strategic view of future defense capability requirements and further details the principles and processes that underpin procurement and industrial decisions (Ministry of Defence UK, 2005).
- *Defense Technology Strategy (DTS)*. The DTS was issued in 2006 by the Minister of Defense Procurement. The DTS provides the clarity and direction needed for success by describing the underpinning technologies that are important to the defense sector (Ministry of Defence UK, 2006).

Based on the DIS, the UK retains a sizeable, open, and broadly-based defense industry to deliver a large proportion of needs of the Ministry of Defense (MOD). But the DIS also stated that the UK continues to welcome overseas investments, especially from companies that create value, employment, technology, or intellectual assets in the UK and thus become part of the UK defense industry.

The implementation of the three documents is described as follows:

(1) Improve Coordination Between Government and the Defense Industry

The MOD aligns its own and industry's behaviors and processes in order to ensure that the capability requirements of the armed forces can be met now and in the future. Armed forces need a continuous supply of equipment with consistent performance, especially if they are in conflict situations. Failing to sustain the capability in the UK would lead to reliance on a single overseas source and might cause monopolistic issues that could bring harm to the UK (Ministry of Defence UK, 2005).

(2) Policies That Encourage and Support Research

The Minister of Defense Procurement issued the DTS in 2006. The DTS sets out MOD R&D priorities for providing future military capability. The government realizes that investment in defense-related technology is critical to retaining access to cutting-edge military capabilities. The budget for investment in R&D is quite large, at approximately £2.6 billion (8% of the defense budget) each year (Kane, 2009). This sizable expenditure is intended to encourage innovation in order to support the UK defense forces.

(3) Policies Targeted to Supporting Enterprises with a Global Comparative Advantage

According to the DIS, government also plays a role as a regulator. And as a regulator, the government believes it has a significant and direct impact on the business environment and plays an important role in maintaining competitiveness in UK markets. However, in some cases, government takes special actions to support some domestic companies with a global comparative advantage. The companies are very important for the government in earning economic benefits and retaining defense capabilities in the UK. For example, the government holds special shares in BAE (British Aerospace) Systems and Rolls-Royce to protect some of its vital defense industry capabilities (Kane, 2009).

(4) Policies That Help Firms Access Global Supply Chains

Whenever possible, the government, as a customer is willing to use open market standards. Building standards different from common international standards would make it difficult for the UK's defense industry to sell its products. The government also plans to actively support exports and provide fiscal incentives, such as tax breaks for R&D and providing a cash sum for some SMEs to encourage innovation. The government offers assistance to SMEs, including loan guarantee for small firms, Manufacturing Advisory Service to provide diagnostics and advices for manufacturing excellence, and support to implement best business practices (*Ministry of Defence UK, 2005*).

(5) Policies That Create a Pro-Competitive Environment

The DIS requires the UK government to produce an attractive environment for industry by maintaining a stable, macro-economic, and political environment. The

government also makes efforts to maintain a highly skilled work force by supporting education and basic science. The DIS also mandates that government takes measures to help keeping the cost low for setting up and running businesses.

(6) Offset Policies

The UK does not have official policy on offset requirement and in big effort to create a business environment that encourages foreign contractors to use UK firms as subcontractors. This objective is achieved by establishing a stable economic environment and investing in science and engineering training (Kane, 2009; Berkok et al., 2012).

b. France

France is one of the world’s largest military exporters. In 2013, revenues earned from the defense industry were USD \$78,213 million (SIPRI, 2014), as shown in Figure 8. From a European perspective, France has a powerful defense industry, which for many years has been the main supplier to the French armed forces. Among European countries, France has most consistently used the power of the state to support selected industries and companies, especially those linked to national defense and infrastructure (Owen, 2012).

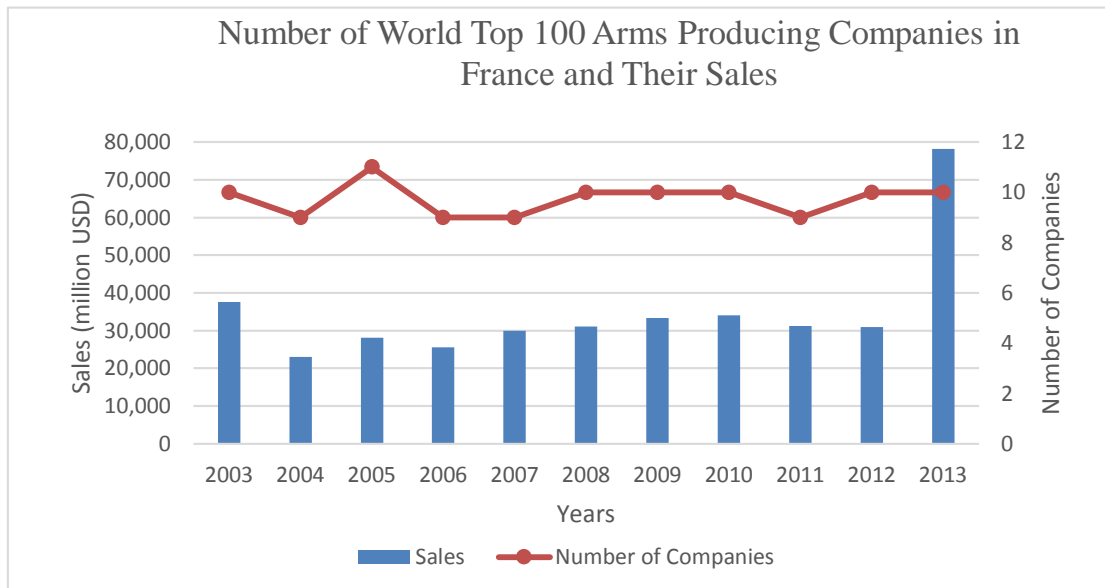


Figure 8. Number of Companies in France and Their Sales (after SIPRI, 2014)

In France, the state has a deep-rooted tradition of defense-industry ownership. There are three types of state-owned enterprises: state enterprises that have no juridical identity; public enterprises that have juridical identity, follow private law, and the state is the only owner; and national enterprises that have juridical identity and the state has direct or indirect influence on them (Eliassen, 2002).

Disarmament following the end of the Cold War resulted in the downsizing of defense industries throughout NATO, and the French also suffered from this. After 1991, French military outlays were reduced, many markets shrank, and, consequently, there was a reduction in the arms industry (Eliassen, 2002). Eliassen (2002) also explained that the reduction of national defense budgets, the explosion of R&D expenditures imposed by the growing complexity of arms systems, and the competition from American companies forced the arms sector to adapt. A policy of privatization, which began in 1986, was one option applied by the state. A restructuring program was started in 1996 and was followed by a merger of some companies, such as the merger of Dassault and Aerospatiale. However, France continued to protect and tolerate inefficient and loss-making nationalized defense companies dependent on national orders (Eliassen, 2002).

The business and government leadership in France realized that R&D carried out by itself and other European countries is inefficient. It is difficult to match the benchmark that the United States has established with its huge budget and high technology. Therefore, the main solution—amid tough current market conditions, exploding R&D costs, and the general crisis in the defense sector—was international collaboration between France and other countries, mainly EU countries. France strongly supports the development of a European defense sector, preferably with itself as the leader (Kane, 2009).

The French government has integrated defense policy with economic and industrial policies, and consistently views its defense industrial base as important for both national security and for the country's overall economic well-being due its close links to strategic civil sectors (aerospace, space, telecommunications, and information technology; Kane, 2009).

The general French government policy regarding the defense industry includes:

(1) Improve Coordination Between Government and the Defense Industry

France regulates coordination between the government and the defense industry without an implicitly stated policy, possibly because the government was instrumental in establishing the defense industry. But the thing that should be appreciated is the consistency of the government in utilizing domestic production and their efforts to actively develop domestic defense industry capability (Eliassen, 2002).

Procurement of defense arms articles in France is carried out by the General Delegation for Armaments (DGA). Kane (2009) explains that one directorate under the DGA, the Central Service for Industrial Affairs, is responsible for defense industrial policy and oversees the condition and capabilities of the company's defense industry. The directorate is entitled to take actions aimed at improving the competitiveness and profits of the French defense industry.

(2) Policies That Encourage and Support Research

The DGA has responsibility in controlling research and development in French armament program (Eliassen, 2002). To focus on the R&D program, the *French White Paper on Defence and National Security* (Minister of Defense of France, 2008) mentioned eight industry sectors and technologies that would be a priority until 2025: nuclear systems, space systems, naval systems, aeronautics systems, land systems, missile systems, security of information, and electronic components.

Although not explicitly referred to as a specific form of support, the French government gives mandates to the MOD to prioritize the preservation of R&D capabilities in certain key technologies and to implement periodic assessments (Minister of Defence of France, 2013). Kane (2009) explains that the French government draws on private R&D, and reimburses a portion of their costs. The reimbursement rate for defense contractors varies from 2% to 6% of contract amounts, depending on the industrial sector and other criteria (Kane, 2009). Coordination of all matters related to R&D in the defense sector is carried out by the directorate for research, studies, and techniques (DRET) under the DGA.

(3) Policies Targeted to Support Enterprises With Global Comparative Advantage

SMEs have an important role in the defense industry, and the French government recognizes this. The 2013 *French White Paper on Defence and National Security* (Minister of Defense of France, 2013) mentions that the defense industry makes a significant contribution to the French economy. The white paper also mentions there are nearly 4,000 companies in the defense industry, as well as a large number of SMEs. Therefore, support for SMEs is very important. The white paper does not describe the specific support for SMEs, only saying that French SMEs would be provided guidance by professional defense organizations, with the support of the state.

(4) Policies That Help Firms Access Global Supply Chains

Given the current national and European market conditions where demand for arms has declined, this has resulted in excess capacity. Therefore, the industry needs to find new markets outside of France and Europe. In the 2013 *French White Paper on Defence and National Security* (Minister of Defense of France, 2013), the French government stated the importance of an active export policy, particularly for sales outside of Europe. It explained in the white paper that the French government believed that its armament export policy would be an effective and competitive solution to meet the needs of its allies and support the sustainability of its economy and defense industry.

(5) Offset Policies

France does not officially mention the implementation of offsets for its defense industry in its policies because the French are somewhat skeptical of offsets. They recognize that offsets increase prices and create inefficiencies in the market. However, in practice, France demands offsets whenever possible to improve and develop its defense industry (Eliassen, 2002).

The French do not believe that international cooperation is a form of offsets, but they do believe that international cooperation benefits the development of the defense industry (Eliassen, 2002). Therefore, France initiated a cooperation program among European countries. One example of this program is the joint development of the Tiger

Eurocopter between France and Germany (Eurocopter Tiger [EC665] Attack Helicopter, n.d.).

In so doing, the French government is not responsible for the offset between industrial companies; the responsibility belongs to the industrial companies involved. The DGA acts only if the French government has an offset obligation with foreign governments, and does not intervene in the offset obligation between foreign governments and French companies (Eliassen, 2002).

3. Tier III: South Korea

A developing country in Asia, South Korea is in a volatile area South Korea is still technically in conflict with its neighbors, North Korea and China. As a result, South Korea has invested heavily in its defense industry which earned USD \$85,569 million in revenues in 2013 (SIPRI, 2014). Figure 9 shows sales made by South Korean companies listed in the world’s top 100 arms-producing companies, according to the SIPRI.

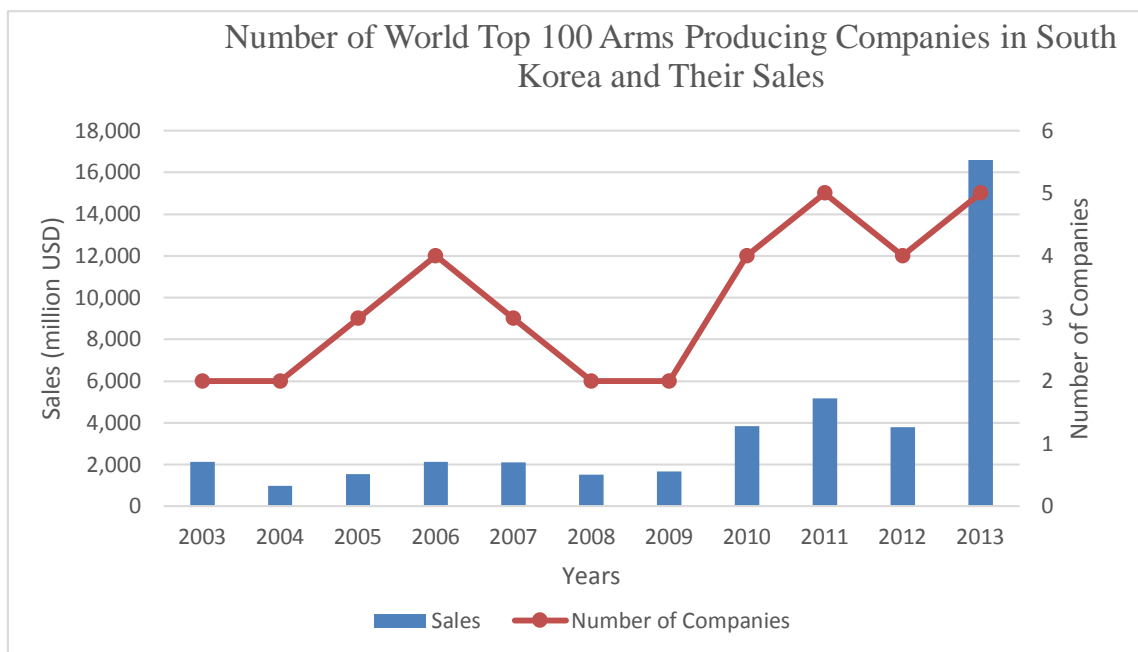


Figure 9. Number of Companies in South Korea and Their Sales (after SIPRI, 2014)

According to global security organizations, based on historical data from South Korea's defense industry, the industry can be described as follows: Starting in the mid-1960s, when South Korea relied on its allies (in this case, the United States), all of its equipment was procured from the United States, and South Korea did not have the ability to produce its own weapons. South Korea developed a policy to establish its own defense industry by embracing its allies. Therefore, in 1971, the South Korean Ministry of Defense created the Defense Procurement Agency (DPA). The DPA's main duty is to manage all procurement of South Korean defense articles, from material procurement to military construction projects, as well as to manage the logistics supply, set up acquisition agreements, and standardize the defense articles that are acquired. In the same year, South Korea started to build its own simple weapons by obtaining licenses from the United States. South Korea started assembling Colt M-16 rifles to support its basic military needs; it was not authorized to produce more than that. Based on the industrial classification provided by Bitzinger (2009), this action placed South Korea in the tier III arms-producing countries, meaning it could support its basic needs by copying the articles and technology from other countries without any further development (Global Security.Org, 2014).

In the mid-1970s, the government began the assembly of not only Colt M-16 rifles, but also other articles, such as mortars, grenades, and mines, and it started to produce ammunition for its own military needs with U.S. assistance. The government supported the development of its defense industry by introducing three laws, better known as "Seoul's Policy": the Defense Industry Law of 1973, the Republic of Korea (ROK) Armed Forces Build-up Improvement Plan of 1974, and the Defense Tax Law of 1975. These three laws provide clear guidance to the defense industry including incentives for funding businesses. The government also invested its funds in the steel industry, electronics industry, and shipbuilding companies. The military budget became a priority in South Korea's national budget (Global Security.Org, 2014).

By 1990 the South Korean defense industry provided 70% of its weapon requirements. This provided South Korea the ability to engage in joint ventures and joint production with key allies. In 1990, South Korea became a leader in shipbuilding, and this

achievement attracted foreign investors, including countries and financial organizations (Global Security.Org, 2014).

By 2007, South Korea claimed it was 100% self-sufficient in traditional weapon systems, and it intended to continue improving its ability to produce advanced weapons as it aimed to raise its profile in the global defense industry (Global Security.Org, 2014).

The government enacted several policies to protect and sustain its defense industry. The four main policies are:

- a. A policy for offsets;
- b. A policy for export development via marketing support and assistance;
- c. A policy for increasing competitiveness in the domestic defense industry;
- d. A policy for enhancing transparency and coordination in defense procurement.

These policies jointly affect the development of the South Korean defense industry. They can be explored further in the context of the six policies common in the defense industry defined by Berkok et al. (2012):

(1) Improve Coordination Between Government and the Defense Industry

South Korea's procurement organization is called the DPA. In order to improve the transparency and effectiveness of arms trades, the DPA was converted into the Defense Acquisition Procurement Agency (DAPA) in 2006. This organization manages all acquisition projects and is also responsible for making connections between government and the domestic defense industry. . Lessons learned from the past show that a lack of coordination and supervision in this industry resulted in products of questionable quality and where there was limited transparency. The government has a policy for ensuring that only qualified personnel apply for jobs as team member at DAPA, and provide on-the-job training and other professional advancement programs to improve transparency and quality assurance in the defense industry. The government also manages an integrated defense program management information system. This system promotes transparency and coordination between the government, DAPA, and the defense industry (Kim, 2010).

(2) Policies That Encourage and Support Research

The DAPA, through its authorities, prioritizes bids from contractors who offer to transfer technology. The South Korean government requires foreign contractors to provide an offset of technical training in every contract in order to transfer knowledge. Contractors can also provide third parties in the domestic defense industry R&D, as well as product testing. Other offset agreements between foreign companies and the South Korean government set up joint research to develop new technologies by sending teams to the company or its research facilities (Berkok et al., 2012).

(3) Policies Targeted to Support Enterprises With Global Comparative Advantage

The government still subsidizes SMEs to improve their power to compete in highly competitive global markets, hoping in the long run they will survive and become sustainable without any government assistance. This is a critical point for South Korea: turning from a policy of import substitution to export promotion. The subsidies encourage companies to vertically and horizontally integrate and innovate to survive and thrive in global markets (Berkok et al., 2012).

(4) Policies That Help Firms Access Global Supply Chains

The South Korean government realized that, in order to compete internationally with its defense products, it needed strong marketing. To provide smaller companies a fair chance to compete and win contracts, the government established a marketing consortium. This consortium attempts to match customer needs with small company capabilities. This is one form of policy support and assistance provided by the government to protect and develop its domestic industry. This policy may have contributed to the increase of South Korea's exports, from \$1 billion in 2004 to \$2.4 billion in 2011 (Global Security.Org, 2014).

(5) Policies That Create a Pro-Competitive Environment

The DAPA, as a government body that manages the acquisition process and the development of the defense industry in South Korea, required the government to

discontinue its policy to support and protect infant industries, and to promote competition and avoid inadvertently discriminating against other industries (Berkok et al., 2012).

(6) Offset Policies

The main reason given for the South Korean government for its offset policy is to upgrade its capability to produce high tech weapon systems. The goal of South Korea's procurement organization called the DAPA (Defense Acquisition Procurement Agency), previously called the DPA (Defense Procurement Agency), has been transformed into a guideline called the 2020 Defense Reform Plan, which provides rules for implementing offsets:

1. All projects greater than or equal to \$10 million should involve offsets; contracts below this level are subject to DAPA review, which decides whether or not to apply an offset policy.
2. The offset requirement is a minimum of 50% of the contract value.
3. The offset guidance is 60% for direct offsets for related defense technology development in domestic production, and can be 40% for indirect offsets, such as investments in domestic companies, or the establishment of new ones.
4. The maximum time to execute the contract with offsets is five years.
5. The penalty for a contractor that cannot fulfil an offset obligation 10% of the contract value, and includes an exclusion from future projects (Berkok et al., 2012).

In 2011 the United States exported more than \$1 billion in armaments to South Korea, and South Korea received \$500 million in offsets from the U.S. company that had the procurement contract, to help develop its defense industry, especially in R&D (Global Security.Org, 2014).

B. COSTS AND BENEFITS OF GOVERNMENT POLICIES

Because the defense industry can play an important role in the survival of the state, many governments grant some priority to their defense industry. However, based on a careful review of literature, both benefits and costs appear when government enacts policies regarding the defense industry. The costs and benefits discussed below are based on Berkok's six common policies (Berkok, 2012):

1. Policy to Improve Coordination between Government and the Defense Industry

Government, as the primary stakeholder in the defense industry, often enacts policies to control that industry and improve coordination between itself and the defense industry. The examples drawn from several countries suggest that governments prefer to establish a lead agency. For example, South Korea has the DAPA, France the DGA, and the United States the MIBP. Governments grant these agencies the responsibility and power to oversee their defense industries. This action can offer benefits to the government and the defense industry:

- a. There is better coordination between government and industry; governments can address their own interests, but also take account of those of industry; the industry can lobby the government to help develop the defense industry. This policy can reduce bureaucracy and accelerate development of the defense industry (Berkok et al., 2012).
- b. By establishing a single agency to communicate with the defense industry, governments can provide supervision and propose actions to support its domestic defense industry. In globally competitive markets, national interests can rapidly be addressed based on data already collected by the agency (Berkok et al., 2012).

Unfortunately, even though the government and defense industry can gain from this policy, there are costs to this implementation:

- a. Monopolies, with their power granted by government, can endanger both the defense industry and the government. Misleading analysis or casual reviews can lead to poor decisions by the government. The other issue is transparency. An organization with monopoly power tends to build its own bureaucracy that is not familiar to outsiders and adds costs and promotes unproductive actions (Berkok et al., 2012).
- b. Too much power concentrated in a government organization may be used to commit fraud based on the fraud triangle: if there is opportunity; pressure

in the organization; personal interest; and rationalization from the person or group that commits fraud. Power concentrated within a procurement agency creates an opportunity for government capture. The risk is that defense industry companies are tempted to invest in influencing officials and politicians for protection and other favorable policies, instead of investing to improve the product or service to make their products globally competitive. The most common fraudulent actions are corruption, bribery, kickbacks, and other actions that benefit a company or industry at the expense of taxpayers (Berkok et al., 2012).

2. Policies That Encourage and Support Research and Development

Policies that promote R&D also involve benefits and costs:

- a. Government, as a stakeholder in the defense industry, often creates an environment to support domestic research through subsidies, offsets or other policies. Some countries successfully invent new technologies that make them competitive in the global marketplace. South Korea, for example, started to build its defense industry in 1970 by getting the license to assemble small conventional weapons from U.S. companies in order to fulfill its own basic military requirements. The government imposed regulations that required offsets from foreign companies to provide R&D domestically or as joint research in the foreign company, or in a local third party company. Partly as a result, by 2007, South Korea provided 100% of its own basic needs for conventional weapon systems and became a global competitor in shipbuilding and other defense equipment (Global Security.Org, 2014).
- b. South Korea, for the first time in 1970, was classified as a tier III country based on its capability to reproduce and copy armaments based on licenses from the United States. The government imposed policies supporting R&D, and slowly removed subsidies as the infant industry expanded in order to make it more independent. The government provided subsidies for SMEs

mainly to assist them in competing globally and to encourage them to adopt new technologies. By early 2000, South Korea had become a country with the capability to modify and adopt new technology, upgrading its status to a tier II industry with an important role in the global defense market (Global Security.Org, 2014).

The government support of R&D also had consequences:

- a. Supporting a domestic defense industry affects other priorities because R&D requires a large budget to accomplish its goals. R&D is not always successful; there are risks of failing, and further research is then needed, requiring additional funding (Berkok et al., 2012).
- b. The policies require that any contractor transfer knowledge through joint research or invest in a domestic research company. This agreement needs to be carefully managed to ensure relevant research is conducted and integrated into new systems that are efficient and effective (Berkok et al., 2012).
- c. The risk of corruption is also significant given the large budgets involved in any government policy that supports domestic companies to engage in research. Unfortunately, if the research efforts fail, further research and more funds are required. There is a risk individuals or research companies could collaborate with corrupt government officials or agencies that have the power to approve funding (Berkok et al., 2012).

3. Policies Targeted at Supporting Enterprises with a Global Comparative Advantage

There are many ways governments support their SMEs, for example, through subsidized funding or policies that protect them in competition. This action can bring benefits to SMEs and the government (Berkok et al., 2012) as follows:

- a. By supporting SME companies, the government provides them an opportunity to survive and compete with other big companies globally.

- b. By providing SME companies with contracts and maintaining their capabilities, these capabilities can be used to satisfy government requirements.
- c. By supporting SME companies, the government can maintain some competition in its defense industry if large companies receive less government support.

However, there are possible negative consequences of government support for SMEs:

- a. By providing SMEs with assistance through funding or regulation, the government indirectly creates dependent companies that lack creativity because they become dependent on government largesse; therefore, there is no incentive for them to compete or develop/integrate new technologies;
- b. This support can also result in unfair competition if the government favors contracts completed by SMEs. Another corruption risk occurs when contract specifications are specified to match a particular SMEs' abilities, favoring that SME at the expense of others (Berkok et al., 2012).

4. Policies That Help Firms Access Global Supply Chains

Governments can support their defense industries via regulations to help them access global markets, not only through marketing their products, but also in facilitating acquisition of raw materials or conducting R&D (Berkok et al., 2012).

The benefits come along with costs. One consequence of this policy is that opening global markets can harm local domestic suppliers to the domestic defense industry. Another issue is that raw materials purchased from other countries for the domestic defense industry can lead to dependency that can undermine government's goal to promote self-sufficiency (Berkok et al., 2012).

5. Policies That Create a Pro-Competitive Environment

The benefit of global competition is that it encourages efficiency and creativity to produce the best possible products and services which is required for a defense industry to be sustainable and compete globally.

Competitive environments also involve costs because there are winners and losers. In opening domestic markets, foreign companies can access the market, and if there is no protection for small companies without a comparative advantage, they will be defeated by globalization. This situation can threaten a country's goal to develop its defense industry (Bitzinger, 2009).

6. Offset Policies

The implementation of the offset policy can offer some benefits:

- a. For some tier II and tier III countries offset policies are sometimes used to develop advanced technology provided by a foreign company from a higher tier country. Direct offset policies in Tier II countries can encourage a transfer of technology and knowledge from foreign companies that improves the capabilities of the defense industry, which can be further advanced with additional research and development (Bitzinger, 2009).
- b. Adopting new innovations and upgrades can allow countries to become more independent and globally competitive (Bitzinger, 2009).

The offset policy also comes with costs:

- a. Offsets are not free. Offset policies will increase the price foreign firms charge the buyer to compensate for any transfers of technology or knowledge. It may in fact be less expensive to obtain the product and R&D in two separate contracts rather than bundled in one large contract that reduces the number of competing suppliers (and the benefits of competition) in the market (Berkok et al., 2012).
- b. There is no guarantee that the technology transferred as part of an offset agreement is the latest technology available. There is even a chance that the

technology will soon be obsolete and that more funding will be required to upgrade systems (Berkok et al., 2012).

- c. Offset policies are extremely susceptible to corruption. (Magahy et al., 2010). Since offsets are often in-kind benefits (Training, R&D; school buildings; hospitals; etc.), they can easily be manipulated and require careful oversight to ensure delivery of desired results (Berkok et al., 2012; Global Security.Org, 2014).

In developing government policies to support sustainable defense industries, the benefits and costs of defense policies need to be carefully considered in order to identify the most appropriate policies for a country.

V. CONCLUSION

Governments, as stakeholders in their defense industries, often develop policies to secure the success of their domestic defense industries. Experts have classified countries with defense industries into three tiers: tier I for critical innovator countries, tier II for adapter and modifier countries, and tier III for reproducer and copier countries. This classification is based on a country's defense industry capabilities as well as the level of independence, capital, and government influence in the industry; the less government influence, the more sustainable the defense industry.

Governments support their domestic defense industries through a variety of policies. Six general government policies are commonly used in order to support defense industries.

Along with benefits, there are costs related to policy implementation. Every country reviewing its defense industry policy must decide whether the costs outweigh the benefits.

The United States and France are examples of countries that have highly developed defense industries, although they do not set specific formal policies. The United States treats its defense industry the same as other industries and heavily emphasizes competition and the free market. In contrast, the defense industry in France has often relied on substantial public support and even government ownership.

World-class U.S. companies like Boeing, Northrop Grumman, and Lockheed Martin are heavily engaged in a competitive global defense industry. However, applying a mostly free-market competition policy is facilitated when industries have strong businesses and their own cutting-edge technology and a comparative advantage in the marketplace.

Even though the United States promotes free-market competition, the competition is often limited to domestic firms and U.S.-allied countries that have reciprocal relationships with the United States.

Among the six common policies often adopted for the defense industry, many countries attempt to:

- a. *Improve coordination between government and the defense industry.* For example, in the UK, the MOD acts as the coordinator, and the DGA has the same function in France.
- b. *Encourage and support research.* The United States, the UK, and France, have spent substantial amounts of their budgets to support research in their respective countries.
- c. *Help firms access global supply chains.* The United States, the UK, France, and South Korea provide significant support for their defense industries to help them compete in global markets.
- d. *Offsets.* Many countries adopt some form of offset policy, especially countries whose defense industries are not yet mature and successful. Despite the risk of corruption, they require offsets to transfer technology, engage in joint research, facilitate joint production, or transfer knowledge through training.

The policies above are the most common. Other policies are less frequently applied:

- a. *Create a pro-competitive environment.* This policy uses competition to encourage the manufacturing of high-quality products, but is usually applied only in countries where domestic defense industries have matured and are sustainable, and also where there are multiple competing suppliers (e.g., Boeing and Lockheed Martin in aircraft manufacturing).
- b. *Support global enterprises with comparative advantage.* There is no government policy that explicitly mentions support for firms to develop a global comparative advantage. Generally, government support for the defense industry is to secure supplies for the armed forces and to maintain the surge capabilities of the defense firms. Some European countries, such as France, Germany, Spain, and Italy, even work together to develop and manufacture joint military equipment, such as the Tiger Eurocopter and NH-90, in attempts to achieve efficiencies in equipping their armed forces.
- c. In fact, there is always an opportunity for countries to develop a comparative advantage in some part of the defense market. For example,

while U.S. weapon systems are highly sophisticated, they are also very expensive, and not all countries can afford to buy them, or can only do so in small numbers. So other exporter countries may have a comparative advantage in selling less expensive, lower-tech systems that are good enough for other countries.

Governments must also carefully consider the costs of any policy. Costs that commonly appear include:

- a. *Corruption risks.* When the government appoints an organization to take care of all defense industry business, this kind of power can lead to corruption. The government has to have checks and balances to minimize the risk. . The government provides subsidies to certain domestic defense companies in order to promote competitiveness and protect them from global competition. This can include large budgets for research and development. The government should have procedures in place to identify any red flags and take appropriate action to minimize the risk of corruption that can not only destroy the defense industry, but also the security of the country.
- b. *The strategic issue regarding dependence on other countries.* The government goal of adopting policies to promote and sustain a defense industry is often aimed at achieving self-sufficiency. But both the benefits and costs of policies must be considered. The high price paid for policies that encourage self-sufficiency may not in fact yield the desired benefit of a sustainable and globally competitive defense industry.

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APPENDIX

The following is an executive summary written in our native language for the convenience of our countrymen and women.

Seluruh angkatan bersenjata di dunia membutuhkan peralatan militer untuk melaksanakan tugasnya. Kebutuhan peralatan militer dapat dipenuhi salah satunya dengan memiliki industri pertahanan dalam negeri. Pemerintah berperan penting dalam kemajuan industri dalam negeri disebabkan fungsi pemerintah sebagai pembeli dan pembuat aturan.

Industri pertahanan dunia secara umum dapat dikelompokkan menjadi tiga yang sekaligus menunjukkan tingkat kemajuan industri pertahanan suatu Negara. Kelompok tersebut adalah: *critical innovator*; *adapter* dan *modifier*; dan *copier* dan *reproducer*.

Untuk memajukan industri pertahanan dalam negerinya, suatu Negara membuat kebijakan yang disesuaikan dengan situasi dan kondisi Negara tersebut. Sehingga terdapat banyak kebijakan berbeda yang dibuat dan diterapkan oleh Negara-negara di dunia.

Pada *MBA Professional Report* ini, kami mengulas dan menganalisa enam kebijakan umum yang banyak diterapkan oleh Negara-negara di dunia. Kebijakan tersebut adalah: 1) kebijakan yang meningkatkan koordinasi antara pemerintah dan pelaku industri pertahanan; 2) kebijakan yang mendukung kegiatan riset pertahanan; 3) kebijakan untuk mendukung perusahaan yang memiliki nilai komparatif dalam persaingan global; 4) kebijakan yang membantu perusahaan dalam negeri untuk bisa mengakses rantai pasokan global; 5) kebijakan untuk menciptakan iklim industri yang mendukung kompetisi; dan 6) kebijakan *offset*.

Dari hasil analisa penerapan enam kebijakan tersebut di empat Negara yang mewakili tiap-tiap kelompok tersebut di atas, yaitu Amerika Serikat, Inggris, Prancis dan Korea Selatan, didapatkan kesimpulan sebagai berikut:

- (1) Di antara enam kebijakan tersebut, terdapat empat kebijakan yang sering diterapkan oleh Negara-negara tersebut, yaitu: 1) kebijakan yang meningkatkan koordinasi antara pemerintah dan pelaku industri pertahanan; 2) kebijakan yang mendukung kegiatan riset pertahanan; 3) kebijakan yang

membantu perusahaan dalam negeri untuk bisa mengakses rantai pasokan global; 4) kebijakan *offset*;

- (2) Dalam penerapannya, perlu diperhatikan adanya resiko yang dapat timbul sebagai berikut: 1) resiko terjadinya korupsi, 2) isu strategis mengenai kemandirian suatu Negara dalam hal pemenuhan kebutuhan peralatan pertahanan.

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