

**POLITICAL ECONOMY OF INDIGENISATION OF DEFENCE  
PRODUCTION IN REPUBLIC OF KOREA, 2003-2011**

*Dissertation submitted to Jawaharlal Nehru University  
in partial fulfillment of the requirements  
for award of the degree of*

**MASTER OF PHILOSOPHY**

**MANGZAMUAN**



**Korean Studies Division  
Centre for East Asian Studies  
School of International Studies  
JAWAHARLAL NEHRU UNIVERSITY  
New Delhi-110067  
2012**

The 21<sup>st</sup> July, 2012

**DECLARATION**

I declare that, the dissertation entitled, “*Political Economy of Indigenisation of Defence Production in Republic of Korea, 2003-2011*” submitted by me for the award of the degree of MASTER OF PHILOSOPHY of Jawaharlal Nehru University is my own work. The thesis has not been submitted for any other degree of this University or any other university.

.....

**MANGZAMUAN**

**CERTIFICATE**

We recommend that this thesis be placed before the examiners for evaluation.

.....

**Prof. Srikanth Kondapalli**  
Chairperson, CEAS

.....

**Dr. Jitendra Uttam**  
Supervisor

*Dedicated to my parents,*

*Rev. Khaikhanthang*

*and*

*Mrs. Donkhanngai*

## **Acknowledgement**

*This work could not have been completed without the help and support of my teachers, family members and friends, who contributed in different ways of their capacity.*

*First and foremost, I would like to express my heartiest thanks to my supervisor, Dr. Jitendra Uttam for his guidance, advice and encouragement. It is with his strong support and help that I was able to carry out my work without any interruption. His teachings and suggestions have shaped my thinking and have broadened my knowledge, which I will always treasure.*

*I am grateful to Professor Srikant Kondapalli, Chairperson CEAS, who has given me useful comments and suggestions. He is kind enough to help me whenever I approach him for his guidance. With his strong zeal of learning, he encourages me not to give up my research work despite the hardship that I face in finding the required materials. Dr Varaprasad has also greatly encouraged me and rendered any help that I needed from him. I shall be indebted to him for kindness in extending the necessary help to me. And also, many thanks to Dr Lalima Verma, ex-Chairperson of CEAS and Dr Sabrani Roy Choudhury for their sincere teachings and guidance for my academic work.*

*I am thankful to the staffs of Jawaharlal Nehru University (JNU) Library, Delhi University (DU) Library, Institute of Defence and Security Analysis (IDSA), The United Services Institution of India (USI) and Teen Murti Library, New Delhi, for permitting me to access study materials for my research work. I would also like to extend my thanks to the University Grant Commission (UGC) for providing me financial assistance through Non-NET Scholarship and Rajiv Gandhi National Scholarship (RGNF), without which I will not be able to complete my work.*

*The prayer support of my parents and family members has been a great source of strength and encouragement. I am grateful to them for their unceasing prayers. I would also like to extend my gratitude to members of my parent-church Thangkhal Bible Church (TBC), Churachandpur Manipur, Jawaharlal Nehru University Christian Fellowship (JNUCF), Zomi Christian Fellowship (ZCF) Delhi Fasting Group for upholding me in their prayers and encouraging me in difficult times throughout my writing.*

*I am grateful to my spiritual mentors - uncle CB Samuel, Bible teacher of JNUCF and his wife auntie Selina, senior CF members - Dr Joy Pachuau, Dr Sona, Bonie ma'm, and also to Rev. Jangkhonun Mangte, Local Pastor ZCF-D and Upa Swanzalian, Chairman ZCF-D, for their spiritual guidance and motivation. May you all continue to do the good work in Christ.*

*The friendship that I share with friends in Christ - Akho, Heroka, Singsing, Athang, Lipok, John, Lung, Levi, Rosy, Rachna, Apem, Avey, Janeth, Nancy, Lovi, Ruth Khan, Kenei, Arenla, Bokali, Chichanbeni, Mami, Geyin and Augustine - has made my life in the campus enjoyable, valuable and more meaningful. I will always cherish the good time that we spend together.*

*I thank God for unconditional love and faithfulness in my life. I praise His mighty name for leading me this far and enabling me to complete my work.*

Mangzamuan

New Delhi  
The 27<sup>th</sup> July, 2012

## ABBREVIATIONS

ADD	Agency for Defense Development
ADEX	International Aerospace and Defense Exhibition
AECA	Arms Export Control Act
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
DAPA	Defense Acquisition and Procurement Agency
DPA	Defense Procurement Agency
DPRK	Democratic Peoples' Republic of Korea
DRP	Defence Reform Plan
DTaQ	Defense Agency for Technology and Quality
FIP	Force Improvement Plan
FMS	Foreign Military Sales
GDP	Gross Domestic Product
GNP	Grand National Party
HCI	Heavy and Chemical Industry
HCI	Heavy and Chemical Industry
ITAR	International Traffic in Arms Regulations
JASSM	Joint Air to Surface Stand-off Missile
JUSMAG-K	Joint US Military Assistance Group in Korea
KAI	Korea Aerospace Industries
KDIA	Korea Defense Industry Association
KDX	Korean Destroyer eXperimental
KIDA	Korea Institute for Defense Analyse
KISTEP	Korea Institute of S&T Evaluation and Planning
KNIFV	Korea Next-generation Infantry Fighting Vehicle
KOTRA	Korea Trade-Investment Promotion Agency
KPA	Korean Peoples' Army
KSS	Korean Attack Submarine Programme

LIMA	Langkawi International Maritime and Aerospace Exhibition
LPX	Landing Platform eXperimental
MAP	Military Assistance Programme
MBT	Main battle Tank
MEST	Ministry of Education Science and Technology
MND	Ministry of National Defense
PCC	patrol combat corvette
PKX	Patrol Killer eXperimental
R&D	Research and Development
RMA	Revolutionary in Military Affairs
ROC	Required Operational Capability
ROK	Republic of Korea
ROKA	Republic of Korea Army
ROKAF	Republic of Korea Air Force
ROKIT	Republic of Korea Indigenous Tank
ROKN	Republic of Korea Navy
SAM-X	Next Surface to Air Missiles
SAR	synthetic aperture radar
SMEs	Small and Medium-sized Enterprises
TACM	Torpedo Acoustic Counter Measures
TDP	technical data packages
TICN	Tactical Information & Communication Network
UK	United Kingdom
UN	United Nations
UNSC	United Nations Security Council
US	United States
USFK	United States Forces in Korea
USML	United States Munitions List
3CS	Third-Country Sales

## **List of Tables and Graphs**

<b>Sl. No.</b>		<b>Page</b>
<b># Table I</b>	<b>Major Defence Articles Produced in Korea (1970's- 1980's)</b>	<b>32</b>
<b>#Table 2</b>	<b>Major ROK License Production Programmes</b>	<b>34</b>
<b># Table 3</b>	<b>Major ROK Co-Development Programmes</b>	<b>35</b>
<b>#Table 4</b>	<b>Transformation of Korean Defence Industry</b>	<b>36</b>
<b>#Table 5</b>	<b>Three Models ROK Submarines: KDX-I (Gwanggaeto the Great Class destroyer)</b>	<b>40</b>
<b>#Table 6</b>	<b>Defence Contractors and their Major Specialisations</b>	<b>46</b>
<b>#Table 7</b>	<b>The ROK Indigenous Production Tank</b>	<b>48</b>
<b># Table 8</b>	<b>Self Propelled Artillery</b>	<b>50</b>
<b>#Table 9</b>	<b>DAPA Manpower</b>	<b>61</b>
<b>#Table 10</b>	<b>ROK National Defence System</b>	<b>62</b>
<b># Table 11</b>	<b>Major ROK Defence Exports Item and Recipients (2003-20009)</b>	<b>72</b>
<b>#Table 12</b>	<b>Level of Defence science and Technology of Major Countries</b>	<b>83</b>
<b>#Table 13</b>	<b>The Sale and Market Share of Top Ten Defence Contractors (2006)</b>	<b>93</b>
<b>#Graph 1</b>	<b>Major ROK Defence Export Items and Recipients (2003- 2009)</b>	<b>70</b>
<b># Graph 2</b>	<b>Proportion of Defence Budget to GDP and Govt. Budget (1980-2010)</b>	<b>70</b>

## Table of Contents

	<b>Page</b>
<b>Acknowledgement</b>	<b>i</b>
<b>List of Abbreviations</b>	<b>ii</b>
<b>List of Tables and Graphs</b>	<b>iii</b>
<b>Chapter – 1 Introduction</b>	<b>1 – 20</b>
1.1 Introduction	
1.2 Research Problems	
1.3 Literature Review	
1.4 Rationale and Scope of Study	
1.5 Methodology and Variables	
1.6 Theoretical Background	
1.7 The Case of Republic of Korea	
1.8 Broad Classification of Defence Producers	
1.9 Organisation of the Study: Chapters	
<b>Chapter – 2 The Origin and Development of the in the Indigenisation of     Defence Industry in Korea</b>	<b>21 – 40</b>
2.1 Introduction	
2.2 Origin of Defence Under Park Chung-hee (1961-1979)	
2.3 Role of Economic Growth in Defence Production (1962-1979)	
2.4 Role of Heavy and Chemical Industry (HCI)	
2.5 Role of US in Promoting Defence Industry in ROK	
2.5.1 Advantage of the Nixon Doctrine 1969	
2.5.2 The Carter’s Policy of Arms Restraint and Troop Withdrawal	
2.6 ROK Policy of Policy of Industry in the Post- Park Chung-hee (1981-2002)	
2.7 Achievements of ROK’s Indigenisation of Defence Production till the Early 2000s	



**Chapter – 3 Political Economy of Indigenisation of Korean Defence Production 41- 73**

3.1 Introduction

3.2 Domestic Politics of ROK Indigenisation of Defence Production (2003-2011)

3.3 International Politics of ROK's Indigenisation of Defence Production

**3.4 Republic of Korea's Major Indigenous Defence Products (2003-2011)**

3.4.1 ARMY

3.4.2 NAVY

3.4.3 AIR FORCE

**3.5 Improvements in Defence R&D Policy and Research Environment**

3.5.1 Creation of DAPA and its Contribution to Defence R&D

3.5.2 Contribution of DTaQ to Defence R&D

3.5.3 Diversification of the Role of ADD to Promote Private R&D

3.5.4 Improvements in Defence Industry Policy and Defence Exports Promotion

3.5.5 Contribution of DAPA for Defence Industry Development

**3.6 Main Proposals for the Promotion of Defence Industry**

3.1.6 Success of Defence Exports under Roh Moo-hyun and Lee Myung-bak

3.6.2 Reasons for the Success of ROK Defence Exports

**Chapter – 4 ROK's Defence Industry: Constraints and Policy Lessons 74-95**

4.1 Introduction

4.2 US Restrictions on the Export of its Technology

4.3 Low Level of Research and Development

4.4 Defections of Indigenous Defence Products

4.5 Lack of Interest on the Part of ROK Industry

4.6 Lack of Interest on the Part of the Military Personnel

4.7 Structural Weakness of R & D Base

4.8 Some Policy Lessons for ROK Defence Industry

**Chapter – 5 Conclusion 96-102**

**References 103- 108**

# CHAPTER 1

## Introduction

### 1.1 Introduction

Until late 1960s, there was virtually no defence industry in Republic of Korea (ROK, South Korea or Korea henceforth). It was so because ROK was under the military protection of US since the end of World War II. Following its independence from 36 years of Japanese rule (1910-1945) on August 15, 1945, ROK was put under United States (US henceforth) military government trusteeship for three years until a new government was set up under the supervision of US-led United Nations (UN) agency on August 15, 1948. US initiated free military assistance to ROK, as she was too weak to defend herself from the threat of North Korea (Officially Democratic Peoples' Republic of Korea), which was supported by China and Soviet Union (Moon 2007: 1). Then it was dependent on aids from alliance countries during the Korean War (1950-1953).

The Mutual Defence Treaty<sup>1</sup> signed by the US and ROK on October 1, 1953 provided for mutual security assistance in case of an attack by third country. This treaty gave ROK security guarantee and thus, the leaders did not feel the need to pursue indigenous defence production. The government was struggling to reconstruct its economy from the devastation of the war. Since the Korean War, the US and ROK have maintained a strong alliance to protect democracy from communism. Most weapons and equipments of ROK during that time were provided by US through Military Assistance Programme<sup>2</sup> funding till late 1960s. At that time, the Korean economic, industrial and technological levels were too low for domestic weapons production (Lee 1992: 16). ROK was the recipient of an average of \$250 million annually in US MAP in the period following the Korean War from 1953 to 1973 (Moon 2007: 1).

---

<sup>1</sup> The treaty which consisted of six articles was signed in Washington. It came into force on November 17, 1954.

<sup>2</sup> The Military Assistance Programme was established under the Mutual Defence Assistance Act, 1949, passed by US Congress on October 6. It was the first US military foreign aid legislation of the Cold War era which provided for the loan or grant of military equipment, materials and services including training to eligible nations. This free charge military support changed into payment support in the beginning of 1961, then changed into the FMS in 1973.

The ROK decision to move toward defence industrialisation was largely motivated by the quest for increased military reliance to cope the eroding security environment. It was in response to two developments: first, the growth of Korean Peoples' Army (KPA) capabilities in modern equipments; second, the decline of US military assistance in aid, including troops' presence as well as alliance strategy (Hamm 1999: 79). The ROK scepticism toward US security commitment which emerged during the crisis of 1968 was further reinforced by the announcement of the Nixon Doctrine in 1969 and its implementation of the withdrawal of US 7<sup>th</sup> Infantry Division from Korea in 1970-71.

The growth of Korean Peoples' Army (KPA) capabilities in modern equipment was exemplified in the Blue House raid on January 21, 1968 by North Korean commandoes. Two days later, North Korea seized the USS Pueblo and its eighty-two crew members. A year later North Korea shot down a US EC-121 reconnaissance plane with thirty-one crew members. These incidents led ROK leaders to perceive a dangerous vulnerability in its security in the event of an all-out attack by the North. This perceived threat did not by itself drive Korean leaders to pursue self-reliance defence. Rather, it was the soft response of US which disappoint the ROK leaders and general public. Contrary to the Korean government's anticipation of tough retaliatory measures, the US response consisted of mere verbal denunciations. This posture conditioned no doubt by US entanglement in an unpopular and unwinnable war in Vietnam, disappointed and worried the ROK government (Lee 1992: 18).

To make the matter worst, there was decline of US military assistance in aid as have been rightly pointed out in the previous discussion. This was manifested by the announcement of the Nixon Doctrine<sup>3</sup> (*Asian defence by Asians*) by US President Richard Nixon on July 25, 1969. This announcement with which the Nixon administration began to disengage from the Far East was a big shock for the ROK leaders. He stated that the United States henceforth expected its allies to take care of their own military defence, but that the US would aid in defence as requested. It was a move to lessen US military involvement in Asia. The Doctrine argued for the pursuit of peace

---

<sup>3</sup> Also called Guam Doctrine, it was announced by US President Nixon in Guam Island in a press conference. For details see Girling (1970), "The Guam Doctrine" in *International Affairs*, 46(1) pp.48-62

through a partnership with American allies. Shaped by domestic budget politics, the doctrine provided, among other things, for the withdrawal of an entire combat division from Korea by March 21, 1971 (the Seventh Division, with a force of 24,000). This reduction in forces caused the government in Seoul to panic. There was the feeling of insecurity among the Korean people. Many people doubt over the commitments of US in defending ROK.

In response to Nixon Doctrine, South Korean President Park Chung-hee set up Agency for Defense Development (ADD) in 1970. As there had been a fear of external aggression from the North, Self-Reliant Defence was one of the guiding principles of Park Chung-hee regime (1961-79). In 1971, ROK received license to manufacture the American designed M-16 rifle. Three laws were passed for the promotion of defence industry - Law of Defence Industry 1973, Force Improvement Plan 1974, Defence Tax Law 1975, to finance development of defence industry. Under the Korea Defence Industry Promotion Act 1976, the ROK established Korea Defense Industry Association for the purpose of promoting local manufacturing of weapons (Hutchinson 1999: 6). Since that time, Korean manufacturers have seized an ever increasing portion of their defence pie.

By 1980s, ROK was expanding into more sophisticated types of licensed production. Seoul negotiated sizeable offsets i.e. coproduction rights – for several of its arm imports. The coproduction phase reached its peak in 1990s with the granting of manufacturing of F-16 by US in ROK. By the 21<sup>st</sup> century, ROK had built up one of the most impressive defence industrial bases among the newly industrialised states. The local arms industry particularly broad based in scope, fueled by considerable investment in the aerospace, land system and shipping sectors. Consequently, by 1995 nearly 80% of ROK's arms are produced domestically – including combat aircraft, main battle tanks, armored vehicles, warships, submarines and it's becoming increasing self-reliant in missile systems (Bitzinger 2005: 191).

In 2006, the Defense Acquisition Program Administration (DAPA) was created within the Ministry of National Defense (MND) to consolidate eight subgroups that deal with weapons procurement. DAPA bolsters and coordinates existing civilian industries, such as the high-tech sectors, heavy manufactures, ship building and defence industries to create its own version of

military-industrial complex. This ministry not only seeks to supply its own military but will also emphasise on export promotion system.

President Roh Moo-hyun (2003-2007) greatly emphasised on building advanced self-reliant defence. He strived to make Republic of Korea to be a power balancer between the great powers in Korean peninsula. He also encouraged localisation of defence production and took initiative to promote defence exports. As result, in 2006, Korean foreign military sales amounted to \$250 million and \$340 million in 2007 (MND Defense White Paper 2010: 229). The Lee Myung-bak government which came to power in 2008 has chosen “*promoting defence industry as new economic growth*” among one of the national agenda. This is a strategic governmental plan to achieve more robust national economic and industrial infrastructure as well as armed forces with cutting edge technology via promoting defence industry while sustaining economic growth. By 2008, the figure had grown to more than \$1 billion. Defence exports in 2009 jumped 13% to a record high \$1.17 billion, despite the effects of the global financial crisis (Defense White Paper 2010: 229).

In fact, ROK began exporting military equipments in 1975 and the amount of defence exports has risen steadily. The number of international customers increased from 46 countries in 2007 to 59 in 2008 and 74 in 2009 (MND 2010). These countries include Bangladesh, Turkey, Thailand, Indonesia, Kazakhstan, Iraq, Venezuela, Guatemala, Ecuador, Philippines, Yemen, Cameroon and Myanmar. Arms sales have included aircrafts as well as warships apart from small ammunitions. Today, ROK’s military industry employs more than 20,000 people directly and more than 50,000 indirectly, and it accounts for sales of roughly \$6.7 billion. The RO aims to become the seventh-largest defence exporter by 2020 and to create more 50,000 new jobs targeting export volume of \$4 billion (Feffer 2009: 1). Arms exports allow manufacturers to reap greater economies of scale, gain necessary hard currency, and increase employment in the defense sector.

Despite the success in defence export, ROK still spend huge amount of money for purchasing defence products. According to the report of Stockholm International Peace Research Institute (SIPRI), ROK has become the second largest defence importer, after India. In terms of arms

exports, it is rank only in the 15<sup>th</sup> position, which is relatively low. US federal data showed the Korean government brought in more than \$6.5 billion worth of military gears between 2005 and 2009 from the United States alone. US-produced weapons accounted for 66% of arms imported by ROK, followed by Germany (20%) and France (10%). ROK imported defence product accounts for more than ten times the amount of its exports. This shows that ROK has to go a long way to gain from export of defence products.

## **1.2 Research Problems**

ROK continues to be under the security protection of the US. In spite of that, it pursues indigenisation of defence production for building self-reliant defence and has been successful in exporting defence products to various countries. Since its initial stage of military industrialisation, US has been restricting export of arms manufactured under US licenses. In the interest of its domestic producers, the US implemented the Arms Exports Control Act (AECA) 1976 and the International Traffic in Arms Regulations (ITAR) 1976 to prevent selling arms to countries which have terrorist connection or violates human rights. There have been many instances that US prohibit the sales of arms by ROK to countries hostile to the former. This has raised doubts over the success of defence exports by ROK in the future.

### **1.2.1 Hypotheses**

- Politically, ROK's indigenisation of defence production aims at attaining future regional great-power so that the country can be more independent from other countries' control.
- Economically, ROK sees defence production as a new driving force for the national economy and believes that arms sales to third-world countries will be a new economic growth engine.

### **1.2.2 Research Questions**

- What are the new initiatives undertaken by the government for the promotion of defence exports and how far have they been progressed?
- Can ROK indigenisation of defence production lead to self-sustaining economy and self-reliant in defence production?

## **1.3 Literature Review**

There is vast literature available for defence production in ROK. Most of the authors trace the historical origin and development of defence industry in ROK, the policy of the government and the role of United States in promoting defence industry. Some scholars did research on the reasons for arms race in the global context and arms production in the small states, while some of them did on the economic benefits of arms production. The literature review will be divided into five themes – Defence production in small states, role of the ROK government, role of the US in the indigenisation of defence industry, main problems and arms export as a tool for resource diplomacy.

### **1.3.1 Motives of ROK Government in Indigenisation of Defence Production**

Bitzinger and Kim (2005) argue that arms production in a small country like ROK is not economically beneficial. Despite trying hard for more than 30 years, it still possesses limited capacities for becoming self-reliant in arms production, and indigenous arms production has turned out to be neither technologically practicable nor cost effective. Yet, in the face of intimidating technological and economic challenges, ROK continues to pursue an ambitious, overly optimistic, and perhaps even naïve strategy of defence industrialization and arms production. They concluded that “second-tier” arms-producing states such as Sweden, Israel and ROK have not been able to eliminate or substantially reduce their dependencies on foreign suppliers.

They listed four reasons for arms production in ROK: a) Security supply – a powerful motivation behind South Korea’s drive for self-reliance in arms production; b) an outcome of the country’s overall economic developments; c) defence industry – viewed as partially driving the expansion and modernisation of the overall national economy, d) South Korea pursued defence industrialisation not only to rebel North Korean attack but for future-oriented, regional great-power status as well, particularly after reunification.

According to Nolan (1986), the main motives of ROK for independent arms production are: a) its vulnerability to manipulation by the United States; b) the insecurity of alliance with the United States; c) the nationalistic urge towards autonomy, and d) the wish to use military production as a means of promoting economic development.

First, ROK planned to start through the creation of infrastructure and human resources skilled in the ways of modern industrial production, and subsequently through the substitution of domestic production for imports and promotion of arms exports.

According to Ha (1984), since the 1960s, ROK has been committed to the expansion of self-reliant industry. As a result, the country has become one of the leading arms producers and exporters among the industrially developing countries by early 1980s. He divided ROK's defence industrialization into four phases from 1968-1986 according to the external and internal structural changes. The first phase (1960-71) was a period of virtually no defence industry in ROK. In the second phase (1972-1976), ROK rapidly increased its budget for research and development. The North Korean attack of president mansion in January 1968 has given ROK the decision to develop more self-reliant defence forces. With the announcement of Guam Doctrine by US President Nixon in 1969 to reduce its military in Korea, President Park Chung-hee started to develop a broad range of defence industries. Agency for Defence Development (ADD) was created under his direction.

In the second phase (1972-1976), ROK rapidly increased its budget for research and development. The third phase (1977-1981) was marked by a defence improvement following US President Carter announcement in 1977 of the US withdrawal plan of 28,000 troops from Korea. Park administration stepped up its effort for the development of defence industry. The defeat of US Forces in Vietnam in 1975, Korean government examined more seriously the credibility of the commitment of US Forces abroad. As a result, the president and military chiefs devised the Forced Improvement Plan (1976-1980) as a follow up to the five-year Force Modernisation Plan launched in 1971. The main objective of the Fist Improvement Plan (FIP) was to possess within four to five year a self-reliant defence capability through an indigenous industry. By 1977 ROK



defence exports amount to \$ 100 million and by 1979, ROK defence industry began to fill the domestic demand of most basic weapons.

In the fourth phase (1982-1986), as ROK was facing the continuing arms race with the North Korea, the Chun Doo-hwan administration started its second Force Improvement Plan (1982-86), mainly with the help of Defence Tax and US Foreign Military sales. In parallel with this program, ROK has made efforts to advance its defence industry. In the fourth phase, because of the completion of supplying domestic needs in the basic weapons and US control of exporting military items produced with US assistance, ROK industry is facing problems of excess capacity in many plants.

### **1.3.2 Role of the United States in ROK's Defence Indigenisation**

Nolan (1986) stresses the strategic importance of Taiwan and ROK for the US. She gives detail accounts of the role of the US and economic development as the two main reasons for the growth of military industry in ROK. ROK, an important ally of US was given financial support and technological assistance after the World War II. The main reason for US support in defence industry was for national defence of ROK. The US does not only assist ROK's defence industry, but also gives financial support to bear the high cost of defence burden.

After the announcement of the *Guam Doctrine* by US President Nixon in 1969, US liberalised arms sales to its allies – Taiwan and ROK. With US assistance the two countries develop indigenisation of defence production and were greatly success in this sector. However, in the long run ROK became more ambitious and focuses on exporting defence products to the third world countries. This move worried the US, as ROK made a deal to sell defence products to non-ally countries. There are frictions on the issue of technological license and offset rights. Though US could restrict ROK from selling arms to hostile countries, the latter is much more independent from the dictates of the US.

### **1.3.3 Arms Export as Resource Diplomacy**

Despite the weaknesses and limitations, ROK defence industry has been succeeded in exporting defence products to number of countries. Park (2009) opines that ROK has used its success in defence industry for resources diplomacy through defence exports. ROK has been involved in production of dual-use goods, which can be used both for military and civilian purposes. It uses these products as a tool for obtaining the oil and energy it needs. This can be proved by looking at the countries to which ROK exports defence products. ROK has sold arms products to Bangladesh, Kazakhstan and Indonesia all of which are rich in resources such as coal, oil and natural gas. Arms deals have been underway with Philippines, Australia and Venezuela. Furthermore, after withdrawing its troops from Afghanistan and Iraq, ROK has continued to support its alliance with the US, for searching ways to trade with oil rich countries Iraq and Iran.

### **1.3. 4 Main Problems Faced by Indiginisation of Defence Industry**

Indigenisation of defence production in ROK has been facing various problems in terms of efficiency and cost-effectiveness. Bitzinger (1995) has found out at least three major problems faced by ROK defence industry:

First, there is lack of interest on the part of South Korean industry in becoming too heavily involved in arms production. Despite government incentives and pressures, weapons manufacturing does not appear to be a popular enterprise. Second, there is lack of interest on the part of the ROK military to devoting significant time and resources to support indigenuous research and development. And, thirdly, the local arms industry suffers from a number of structural weaknesses in the ROK defence Research and Development (R&D) base. Poor linkages between the defence R&D and manufacturing bases and military production bases characterised mismanagement and weak design.

## **1.4 Rationale and Scope of Study**

This is a study of political economy of arms production in ROK. The scope of this study will be mainly on the rise and development of defence industry in ROK, from an importing country in the late 1960s to an exporting country, covering till 2011. The main focus will be on the major government policies for the promotion of indigenisation of defence production. It will cover the progress and developments of defence industry in ROK, the problems and the success story as well. This will be an in-depth case study. The author believes that case study will help to gain deeper knowledge of the country under study.

There has not been specific international relation theory for the study of defence production in ROK. Most of the past studies used realist perspectives and Richardson's model of arms race as the main motivating force for the defence industrialization in ROK. These two theories to some extent proved right in studying ROK militarisation in the past few decades. However, the recent developments in Korean peninsula and ROK's response preparation for a military modernisation shows that it is not only competing North Korea in defence equipments. ROK has surpassed North Korea military power since the early 1990s after the collapse of USSR.

After the June Summit of 2000 relationship between North and South Korea gradually improved and various exchanges and dialogues between the leaders of the two countries have taken place since then. ROK stopped labeling North Korea as its "main enemy" in its defence white papers since 2004. In spite of that, ROK continues to spend higher amount of budgets on defence and aims at building stronger military power. This shows that ROK's future aim is to be a regional power status to play greater role in the Korean peninsula. It also wants to use arms sales to developing countries as means for economic growth engine.

## **1.5 Methodology and Variables**

The methodology will be by and large deduction method. The scholar will look at defence productions in small countries, in general, and moves to a particular country of study, ROK. The independent variable taken in the study is the policy of government while defence production is

taken as the dependent variable. The policy of United States and the threat from North Korea will be the two intervening variables.

The study will be descriptive and analytical of primary and secondary data. The primary sources will include government documents, archival materials, reports etc. It will also rely on internet sources mainly various government ministry websites. As it is a case study of a selected topic, the scholar will analyse the primary sources comparatively within the existing situation to arrive at a decisive conclusion.

The secondary sources will include books, journals, articles, magazines, newspapers, etc. It will also include websites of different research institutes, online newspapers and magazines. The secondary source of data will be analyses on the comparative and qualitative approach so as to arrive at a significant conclusion.

## **1.6 Theoretical Background**

### **1.6.1 Arms Production in Small State**

#### ***A) Realists Perspectives: Security First***

There have been extensive literature on defence production in small and developing countries. Most of the scholars agreed on the realists' theory of defence production i.e. for survival. Small states produce arms to protect their country from external aggression and to be independent from the control of other's countries. This is best explained in realist perspectives of international relations. According to the realists, international relations are essential conflictual because of anarchy i.e. the absence of a higher authority to prevent aggression or arbitrate disputes. Anarchy also compels states to arm themselves in order to feel secure. The stockpiling of arms and the building of a military, however, are provocative actions which prompt neighboring states to feel insecure and build up their own weapons.

They further argue that security and strategic issues, known as high politics, dominate the international agenda. States' paramount goal is to maximize their power in the international

community, and that they are primarily concerned with military power. In realist perspectives state's pursuit of power is limitless. States produce arms to protect their countries from the aggression and to maximise their power.

### ***(B) Arms Production for the Pursuit of Greater Autonomy***

However, realist theory does not satisfactorily explain the arms production behaviour of various small countries. Many scholars who studied on this topic found out that the main motive behind arms production is to gain autonomy from foreign control. This can be validated by the fact that most of the developing and small countries which opted for indigenization of arms production had faced arms embargoes at some point of time from their suppliers. There are consensus literatures available on this.

According to Ayoob (1995), "domestic arms production is likely to increase the autonomy of decision making in times of war and peace". Although regional conflict drives arms acquisition, it is regional conflict combined with the uncertainty of arms imports that drives military industrialisation. Many of the supplier countries used arms sales as a means for political influence as well as economic gain. The United States which is the largest supplier of arms to developing countries used it as bargaining chips to control its alliance countries and also to get oil supply from Arab countries.

Kinsella (2000) in his study analyses the major determinants of third world military industrialization in the domestic, regional and global level. He listed three most important factors for indigenisation of defence production in small and developing countries. The first is regional security dynamics, where he mentions about how regional conflicts lead to arms production. The second factor is at the domestic level – economic and political-economic factor, where he traces the role of economic development and the state's capacity for allocation of resources for military industrialization. He borrowed a line from Ball (1988), which states that, "*no Third World countries can hope to support arms production if it does not possess a reasonably strong diversified industrial sector.*" The third factor is global diffusion of military technology and culture. Arms production technology transferred from industrialised countries to developing countries through license and co-production.

According to Katz (1986), the most important factor driving developing countries to produce arms is autonomy; that is, freedom of action in the domestic and international spheres. Countries which are dependent on other countries are subject to be under their dictate. Therefore, to be able to stand on their own they need to produce arms in their own countries. This will give them more freedom from the control of other nations. Within this broad category of autonomy, security of arms supply is one of the most important motives. All major developing countries have either been subject to actual arms embargoes and constraints, or have had such actions made by their major suppliers. This has also been the case for many of the small arms producers as well. As a result, they seek to establish their own arms industry to bolster their autonomy.

Another closely related security motive for developing countries is their perception of external and internal threat. If the threat is from external, a country goes for arms race with the particular country and if the threat is internal they want to fortify the military wings for consolidate their power. The country's leaders blend security into its foreign policy so that they can pursue aggressive, expansionistic or hegemonistic.

### **1.6.2 Arms Production for the Promotion of Economic Growth**

Arms productions are also motivated by economic rationales. By manufacturing arms indigenously a country can buy defence equipments at a cheaper price. Not only that, it can also provide employments to its citizens. This also helps in checking brain drain of its technically qualified manpower to work in their own country. Moreover, arms export can be a good foreign exchange earner.

Brauer (2007) agrees to the realist perspectives on arms production for defence purposes – the preservation of territorial integrity and maintenance of spheres of influence. He also argues that arms production is more nearly a matter of economics rather than mere political motives. He has listed the economics reasons as under: First, arms export control and supply restrictions impose a constraint that can compel domestic production of arms component or of whole units by otherwise arms-importing states, even if it is economically inefficient to do so. Second is to

mitigate or remove uncertainties with regard to the reliability of supply lines so that credible threats of supply interruptions lose their sting. Third, it is hoped that domestic arms production might stimulate the domestic economy. Fourth, arms demand is a function of security preferences, national income, and price of arms as well as the price of complimentary and substitute goods.

### **1.6.3 ‘Gun Versus Butter’ Debates**

There has been a heated debate on the economic benefit from arms production. The so called “Gun-versus-butter” i.e. the relationship between defence spending and economic growth is still open for debate. This is an economist perspective on utilising national resources for the benefit of its citizens. A nation has to choose between two options when spending its finite resources. It can buy either guns (invest in defense/military) or butter (invest in production of civilian goods), or a combination of both.

Proponents of building strong military power suggest that defence spending and military industrialisation contribute to the economic development of the country. Whereas, opponents of it suggest that huge spending of national budgets on military purposes have negative impact on the national economy. While Benoit (1973) and several others have argued that defence spending has positive effects on economic growth, Deger and Smith (1983) and Rotschild (1973) have counter-argued by stating that defence spending adversely impacts on economic growth. Therefore, defence spending should be minimised for the welfare of the state. The third group of scholars argue that defence spending does not have negative impact on economic development. The impact of defence spending, according to them, is negligible. All sides have valid points of their own stand. So, the debate will go on without any definite conclusion.

A number of literatures are available on the study of the relationship between defence spending and economic growth. One group of scholars finds a negative relationship between defence spending and economic growth (Derger and Sen 1983, Derger and Smith 1983, Derger 1986, Lim 1983, Faini et al. 1984). The literature on negative impact of defence the growth effect (the guns versus growth tradeoff). The argument regarding the allocation effect is that, the absorption

of government expenditures on defence leads to a shortage of funds for public welfare projects, such as education and health. The argument on the growth effect is that defence expenditures have a dampening effect on investment, which in turn slows down economic growth.

The second group of scholars finds that defence spending has a positive impact on economic growth (Kaldor 1976, Benoit 1978, Kennedy 1983, Weede 1983). The main argument here is that defence spending both directly and indirectly stimulates economic growth by increasing purchasing power, enhancing aggregate demand and producing externalities. Moreover, defence programmes provide employment, education and technical training for a large number of people, thus relieving the private sector of significant social and financial burden.

The third group of scholars finds no relationship between defence expenditures and economic growth (Hill 1978, Biswas and Ram 1986, DeRouen 1993, Mintz and Stevenson 1995). According to them, defence expenditures may have either a positive or negative effect on growth for a certain period of time in countries experiencing conditions. However, defence expenditures do not have a consistent, statistically impact on economic growth.

## **1.7 The Case of Republic of Korea**

### ***1.7.1 Richardson Model of Arms Race:***

This model has been the most widely used theory for the study of ROK militarisation in the past. Richardson (1963) argues that a country's defence spending is reactive to its adversary hostile military actions, defence spending and stockpiling of armaments. Given hostile military interactions between the two Koreas, many scholars applied this theory to study arms race and military spending. Though many scholars agreed with Richardson model of arms race for military industrialisation in ROK, there are some scholars who do not agree to this model since the defence budget between the two countries are not directly proportionate to each others.

In contrast, Hamm (1999) argues that Richardson model of arms race is not satisfactory for explaining arms race between the two Koreas. He suggests that, in order to understand the arms



race between the two Koreas, threat perception, resource allocation and state power should be taken into consideration.

### ***1.7.2 'Gun Versus Butter' Debate:***

In the case of Republic of Korea, there are three perspectives on the relationship between defence spending and economic growth. The past studies report mixed findings. Therefore, there has not been a definite conclusion. It is still widely open for debate and anyone is free to take a stand of his/her own.

#### **(A) Impact of Defence Spending**

Hong (1990) investigates how defence spending influences economic performance in ROK by employing four models – the investment reduction model, the demand stimulation model, the modernisation model, and the export-led model. He concludes that defence spending impede economic growth in ROK.

#### **(B) Positive Impact of Defence Spending**

In contrast to this, Moon and Hyun (1992) claim that ROK defence spending is positively associated with economic growth. Citing an analysis by the Korean Ministry of National defence, the authors note, “58% of defence spending during 1970s contributed to the formation of gross domestic products in terms of value-added effects.”

#### **(C) No Direct Impact on Economy**

In another study, Pank (1993) hypothesise that, “economic growth is a linear, positive function of state power and world economic expansion, and a linear, negative function of foreign direct investment. However, the author finds no statistically significant relationship between defence expenditure and economic growth. Many other scholars like Chan and Davis (1992), Hwang (1994) and John Feffer (2009) also agreed on the insignificant effect of defence expenditure on economic growth. ROK and Taiwan are among the few countries that could attain economic growth despite allocating huge amount of money on defence expenditure.

### **1.7.3 Threat Perception of Defence Industrialisation**

Buchanan and Ellis (1955) hypothesise that a country's threat perception, has resulted in defence industrialisation. The fear that a nation will be under the rule of other countries unless it industrialises itself, has led the Meiji Restoration in Japan in 1868. In the same way, the fear of attacked by North Korea, after the announcement of Nixon Doctrine in 1969 led to the defence industrialisation in Republic of Korea.

The present study will use threat perception of military build up to explain the main motives for the indigenisation of defence production. This theory best explain the military industrialisation of ROK, as it was the North Korean provocative behaviours of the late 1960s and the announcement of Nixon Doctrine in 1969 finally forced ROK to pursue self-reliant defence forces. ROK which has been under the security protection of US since the Korean War, has not felt the need to develop its own defence industry until the fear of US abandonment in the wake of the North Korean attack. The deteriorating US security commitment and the continuous military threat from North Korea pushed ROK to set up defence industry of its own without which the future of ROK sovereignty was at stake. There was a feeling of discontentment from the general public and government on the reliability of US security commitment on ROK.

Setting up defence industry is a daunting task as it involves high capital investment and requires qualified manpower. ROK was not in a position to set up its own defence industry in the early 1960s due to the great devastation caused by the Korean War. In view of the poor economic condition, great consideration had to be taken before setting up defence industry. Due to the security assistance provided by US, ROK leaders did not felt the necessary to set up defence industry of their own. If it was not triggered by the Nixon Doctrine, ROK might not have set defence industry at that time.

However, the ROK leaders had no choice but to pursue a policy of self-reliant defence whatever the cost it may be. The threat perception of ROK leaders has overweight the financial cost defence industrialisation was going to bring. Therefore, Park Chung-hee set up ADD in 1970 to be a pioneer in defence industry with the financial support of the government. This defence R&D agency is responsible for designing and developing the weapons to be locally produced in Korea.

Government subsidised the private companies and encouraged to take the main role in defence production without considering the profit it will give. Knowing the security threat from the North, some companies willingly took part in this project to contribute for the national security.

## **1.8 Broad Classification of Defence Producers**

There has been various classification of defence producing countries according to their advancement of technology and level of production. However, there has not been a definite classification of various countries as there is no clear cut distinction of the level of arms production in different countries around the world. There are broadly three types – i.e. first, second and third-tier - of classification according to the studies done by well-known scholars in the field of military and defence production.

Kraus (1992) classified United States and Soviet Union as the first-tier arms producer, while the second-tier producers include the industrialized countries - Britain, France, Germany, Spain, Italy, Czechoslovakia, Poland, Japan, Canada and Sweden. The third-tier producers include China, Israel, India, Yugoslavia, Brazil, South Africa, South Korea, Taiwan, Argentina and Turkey.

Kinsella (2000) classified US alone as the first-tier arms producer, while second-tier countries include Britain, France, Germany and Russia. The third-tier countries include Brazil, India, Israel, Chile, Indonesia, Pakistan, Singapore, Australia, Czech Republic, Poland and Spain.

The present study will use Bitzinger's (2003) classification of arms producers. The Republic of Korea, which is under study, falls into the second-tier arms producing countries according to his classification. The first-tier arms producers include United States, United Kingdom, France, Germany and Italy that possess the world's largest and most technologically advanced defence industries and consequently dominate the global defence business. These five countries account for roughly 75% of the global armaments production.

Moon and Paek (2010) also stated that ROK elevated from the third-tier arms producer to the second-tier producer since the late 1990s by moving from stage of imitation and assembly to creative imitation and indiginisation.

The second-tier arms producers comprise of a diverse group of countries which include industrially advanced countries possessing small but quite sophisticated defense industries such as Australia, Canada, the Czech Republic, Japan and Sweden. It also includes a number of developing or newly industrialized countries, such as Brazil, Iran, Israel, Singapore, South Africa, South Korea and Taiwan. This group also includes India and China – states with large, broad-based defense industries but still lacking the technological and industrial capacities to develop and produce advanced arms

The third-tier category included those countries that possess very limited and generally low-tech arms production capability such as Pakistan, Egypt, Mexico and Nigeria.

## **1.9 Organisation of the Study: Chapters**

The first chapter is the introduction of the study. With a brief introduction on the whole idea of its history and development of defence in the recent years, the dissertation primarily focuses on both the internal and external factors that would see ROK on the brink of entering the era of restructuring its indigenous defence. The chapter also contains literature review, research questions, hypotheses and theoretical background.

The second chapter describes the rise and development of ROK defence industry. This chapter describes the origin of defence industry under President Park Chung-hee, the role of US, the role of ROK economic growth and the role of Heavy and Chemical Industry in the establishment of defence industry in Korea. This chapter also describes the development of defence industry in the post Park Chung-hee from Roh Tae-woo to Kim Dae-jung administration. It gives a brief highlight of ROK license production from 1970s to indiginisation of defence products till the early 2000s.

The third chapter explores the various policies of government for the indigenisation of defence production under Presidents Roh Moo-hyun (2003-2007) and Lee Myung-bak (2008-2011). Starting from the defence policy of Roh Moo-hyun reflected in the Defence White Paper 2003, this chapter gives the details of various steps taken by ROK government for military modernisation and indigenisation of defence products. It also describes the policy adopted by Lee Myung-bak to make defence export as an economic growth engine.

The fourth chapter provides a brief account of the main problems faced by defence industry in ROK. These includes, US restrictions on ROK arms sales to third country which are produced under US license or coproduction, low budget allocation for defence R&D, low level of technology, lack of interest on ROK industry to invest in defence industry and lack of interest on military personnel on defence R&D.

The final chapter gives the summary and findings of the present study. It comprises of the policy framework and lessons that are drawn as a part of the larger debate.

## CHAPTER 2

# Origin and Development of the Indegenisation of Defence Industry in Korea

### 2.1 Introduction

On January 19, 1970, President Park emphasised the need to develop ROK's defence industry after an inspection of the Ministry of National Defense (MND). Initial emphasis included basic weaponry to arm the homeland reserve force, a production system that centered on civilian firms' production of vehicles and gunpowder. President Park's plan was based on five principles:

(1) gradual development of the industry for the sake of long-term efficiency, competitiveness and safety; (2) establishment of a long-term plan for defense demand and government support; (3) fostering second-source firms among the civilian industry; (4) matching the defense industry plan with the overall economic and heavy-industry development plan; and (5) limiting concentration of defense production to no more than thirty percent to any one firm.

Defence industries differ sharply from other industrial sectors in that they require a synchronised combination of defence technology, heavy capital investment, industrial infrastructure and qualified labor. These prerequisites were available in Korea at the time of the decision to move toward defence industrialisation in the early 1970s. However, ROK did not feel the necessary to develop its own defence industry as it was under the security protection of US during that time. The diminishing US commitment in the face of heightened North Korean military hostility pushed the ROK government to opt for a policy of domestic military industrialisation. The security motive coincided with a set of opportunities then available.

This chapter will highlight the origin and development of defence industry in ROK under President Park Chung-hee in the early 1970s, the policy of the government and progress till the reign of Kim Dae-jung in 2002. From license production in the 1970s and co-production in the 1980s, the industry progressed to develop its own indigenised production in the 1990s. The country started exporting defence equipments from 1975. Despite of having been undergoing various difficulties, the amount reached a remarkable \$1 billion mark in 2008.

## **2.2 Origin of Defence Industry Under Park Chung-hee (1961-1979)**

President Park Chung-hee established Agency for Defense Development (ADD) in August 1970 under the banner of the self-reliable defence. ADD is the one and only national agency for R&D in defense technology contributing to enforcing the national defence, to improving the national R&D capacity. In 1971, the Ministry of National Defense (MND) set up the Defence Procurement Agency (DPA) as an integrated procurement agency. The DPA has since contributed to the modernization of military equipment used by the country's armed forces and strengthened the nation's war potential by streamlining the process of acquiring war materiel. The DPA is responsible for more than 95% of all defence procurement activities in Korea. The DPA handles everything from the initial specification work to payments to contractors. Its major functions include: procurement of defense materials for the Korean military forces; construction of military facilities; sources of supply management; acquisition of price information and cost management; offset negotiation and management; military specification and standardization management.

ROK's defence industrialisation started with the external security threat arising from the North Korea and the deteriorating US security commitments in the late 1960s. In response to the constant North Korean provocative behavior and US lack of commitments, President Park adopted 'self-reliant defence' forces and promoted "indigenisation of defence industry". Weapons production for the army began in 1971 when the Ministry of National Defence constructed a plant to assemble United States-designed Colt M-16 rifles. Prior to that time, Korea had more than one government arsenal producing ammunition and small arms. In the early 1970s, worldwide tension and internal crisis on the Korean peninsula provided the incentives for the Korean government to develop the Korean defence industry and self-defence capabilities.

To cope up with the eroding security environment, ROK initiated a series of attempts to improve its defence capabilities including, Force Modernisation Plan (1971-75) Force Improvement Plan (1976-80) and the Second Force Improvement Plan (1982-86) to accomplish this national goal as soon as possible. Defence spending during this period increased at an annual average rate of 44.3%. In the same year in 1973, a Law on the Defence Industry was passed in order to promote

defence production. The law granted long-term, low-interest loans, tax exemptions, and other incentives to firms producing defense-related items. In 1974, Park initiated the Eight-Year Defence Plan, named the *Yulgok* Project (Force Improvement Plan), which was intended to reduce foreign dependence through domestic production of conventional weapons. Defence Tax Law was passed in 1975 specifically to finance the development of defence industry. The National Defence Tax imposed 10% income and sales tax surcharge. At the same time, a nationwide fund-raising campaign was launched.

In response to President Carter's declaration of plan for withdrawal of US forces from South Korea, in May 1977, President Park increased efforts to develop the ROK's defence industry. At the initial defence industry promotion conference held on June 17, 1977, Park personally directed his cabinet, military staff, and twenty-five representatives from the defence industry to achieve, by the end of 1980, the establishment of a defence industry to a nearly comprehensive spectrum of weapons and self-supporting level, except in the areas of aircraft and certain types of highly sophisticated electronics arms. The FIP was pursued in parallel with the Fourth Five-Year Economic Development Plan (1977-1981). During the Fourth Five-Year Plan, further linkage with the defense industry was ingrained, and massive investment poured into the heavy machinery, iron and steel, shipbuilding, metallurgy, and electronics industries.

By the mid-1970s, Foreign Military Sales credits extended by the US were gradually declining, and by 1975, cash purchases by the ROK for weapons exceeded the value of US military aid. Most of the expenditure during the FIP was financed by the ROK government, and by the end of the 1970s, the ROK was covering more than 90% of its total defence costs. Thus, during the Park regime, the ROK began moving from total reliance on the US to an increasing degree of autonomy, satisfying much of its own needs, and exporting surplus production to third countries, as well. In 1975, a special defense tax was created to further finance defense industry related goals for the period. Through 1976, ROK directed nearly all of its arms production towards meeting domestic requirements.

In addition to mass production of basic weapons, South Korea pushed ahead with development of highly sophisticated weapons. The ROK successfully test-fired a two stage surface-to-surface



missile on September 26, 1978, thus becoming only the seventh nation in the world to produce missiles. The ADD had seen the programme through its design and production stages. In December 1978, the ROK government promulgated the Aerospace Industry Development Act<sup>4</sup> to pursue the establishment of an aircraft manufacturing capability.

### **2.3 Role of Economic Growth in Defence Production (1962-1979)**

The Korean defence industry began in the early 1970s but it could not have succeeded without the economic growth and improvements in the industrial base experienced since the late 1960s. The growth of the Korean economy since independence and after the vast destruction caused by the Korean War is among the most remarkable instances of national economic developmental success in the contemporary world. For the first time in history, President Park Chung-hee launched the First Five-Year Plan in 1962, designed to guide the economy through industrialisation, ultimately paving the way to international industrial export markets and self-sufficiency. Since then the economy of Korea grew by 7.8 % in the First Plan (1962-1966), 9.7% in the Second Plan (1967-1971), 10.1% in the Third Plan (1972-1976). From 1962 through 1978, ROK's real gross national product increased at an annual average rate of nearly 10%, and the ROK was transformed from a typical developing country to that of a moderately industrialised nation.

The main aim of economic activity during the First Five-Year Economic Development Plan (1962-66) was to increase employment. Another goal was to improve the balance of payments. The basic strategy for labor absorption was to apply labor-intensive methods to the construction of new infrastructure, including roads, dams and irrigation projects. For balance of payments improvement, the main thrust was on import-substitute industrialization starting with industries that produce inputs for other industries– cement, fertilizer, refined petroleum, iron and steel and synthetic fiber– that were capital-intensive. Self sufficiency in grains was to be achieved within five years through stress on agricultural productivity increases, mainly through multiple cropping.

---

<sup>4</sup> This act was later replaced by Aerospace Industry Development Act in 1987.

The Second Five-Year Plan (1967-71) emphasized upgrading the industrial infrastructure and rapidly building capital-intensive import-substitution industries, including steel, machinery, and chemical industries. Industrial deepening in the capital-intensive sectors would permit the ROK to absorb technologies that would later be transferred from the United States and also provide the indigenous structure necessary to begin taking on industrial production of weapons. Thus, in 1968, President Park indicated that the ROK was ready to open bidding in the world market for an ammunition and rifle factory. However, heavy and chemical industries, which was one of the target during this period was not very successful due to lack of financial resources and technology. Still then, it has been developing to a certain level with the continual efforts of government.

Important initiative taken under the Third Five-year Plan (1972-1976) was the establishment of additional facilities at civilian industrial firms. Domestic automobile, machine, and shipbuilding companies equipped themselves with facilities to produce designated items. The Presidential Secretariat was instructed to oversee decision making in the defense industry and the heavy chemical industry to fortify the contribution that heavy commercial industry could make to defense production. The per capita income increased from merely \$67 in 1953 to \$1605 in 1980. The fast economic growth has laid the foundation for the development defence industry.

## **2.4 Role of Heavy and Chemical Industry (HCI)**

Under the Third Five-Year Plan (1972-1976), the ROK sought to shift its emphasis from labor-intensive, light manufacturing sectors, to capital intensive, heavy chemical industrial sectors. In 1972, President Park Chung Hee proclaimed that Heavy and Chemical Industrialisation was to be the new direction for the economic development of Korea. Under the Third Five-Year Plan (1972-1976), the ROK sought to shift its emphasis from labor-intensive, light manufacturing sectors, to capital intensive, heavy chemical industrial sectors. In February 1972, the Defence Industry Promotion Committee was established to meet biannually, chaired by the President. In his New Year Press Conference on January 12, 1973, Park declared the government's Heavy and Chemical Industrialisation Policy (HCIP) that would underpin the state's plan for the Big Push

programme under the Yusin<sup>5</sup> reform. He also declared that Korea aimed to achieve \$10 billion in export earnings and per capita GNP of \$1,000 by early 1980s (Kim 2011: 410). On February 2, 1973, a special committee named Heavy and Chemical Industry Promotion Committee (HCIPC) was established in accordance with the presidential decree.

The HCIP put forward three key strategic priorities: (i) export-orientation, (ii) long-range (ten-year) and large-scale planning; and (iii) establishment of a fixed investment fund of \$10 billion. The HCIP designated five main industries to be developed intensively as priority industries: (a) industrial machinery, (b) shipbuilding and transport machinery, (c) iron and steel, (d) chemicals; and (e) electronics. These areas, the HCIP noted, had to be developed as a priority and required comprehensive structural integration of technological industries in Korea, such as, chemical plants, power plants, shipbuilding and automatic production (Kim 2004: 173).

The HCIP aimed at four main developmental goals: (a) economic construction; (b) cultivation of human resources through the modernization of education and cultural revolution; (c) national land development; (d) self-reliant national defence. These goals were integrated to achieve a ‘comprehensive national industry, planned and implemented at the national level (Kim 2004: 173).

The development of Korea’s defence industry was unique in the sense that the companies were to produce different components of weapons. It was developed as a part of the machinery manufacturing industry under the principle of “Components are first produced through the division of labor and then assembled into finished goods by factories in the private sector.” This meant that, all the weapons had to be produced as disassembled components.

Under this principle that components produced in various factories could be assembled into a high quality weapon, as long as the components were made with appropriate materials and specifications, the government could designate manufacturing companies for each of a weapon’s major manufacturing process (not component) to enable the mass production of weapons but also

---

<sup>5</sup> Yusin/Yushin is a term borrowed from a Japanese word “ishin” (taken from Meiji Ishin/Restoration 1868) which means revolution, reform or renew. After declaring state of emergency, Park dissolved Parliament and suspended the Constitution in October 1972. He introduced a new constitution, the Yusin Constitution in December.

minimize the impact of a weapon's production on the normal operating businesses of factories. According to this regulation, 80% of a factory's production capacity was dedicated for producing civilian goods while 20% of the capacity was used for military purposes during peacetime operations (Kim 2011: 415)<sup>6</sup>. In case of emergencies and in war-time, the factories entire production capacity could be dedicated for military purposes.

For the defence industry, the Third Plan focused on reverse-engineering of imported weapons, development of basic weapons, and licensed production in support of conventional weapons development. With technical information provided by the US, the ADD developed production processes and disassembled and reverse engineered weapons already in their possession. To assist the ROK with implementation of the MOD plan, the United States pledged \$1.5 billion worth of assistance to begin in 1971. HCI implementation entered a new phase on September 19, 1973 when Park ordered the commencement of the construction of the Changwon Heavy Machinery Industrial Complex. This complex was allocated 160 million pyong of industrial land (approximately 53,000 hectares), comprising 76 million pyong (25,200 hectares) of industrial space and 84 million pyong (27,800 hectares) of housing land, near Masan Harbour in the south-east of Korea. The complex plan aimed to construct 104 factories employing over 100,000 workers and with an annual estimated output of \$1.5 billion by 1981 (Kim 2004: 185).

The original population of Changwon was about 10,000, comprising 1,700 households occupying about 42 million pyong (13,900 hectares) of farming land. The massive transformation of what was mostly farmland into one of the largest industrial complexes in the world brought new momentum to the HCI triumvirate, especially to their strategy of "Koreanising" industries to build "Korea Incorporated". In this respect, the state's promulgation of the Industrial Parks Promotion Development Promotion Law on December 24 1973 established a strong legislative underpinning for the construction of five additional industrial complexes, each focused on a specific target industry. Yochon was focused on petrochemicals, Okpo on shipbuilding, Kumi on electronics, Pohang on steel and Onsan on nonferrous metals. In this mammoth development, especially of defence-related industries, a total of eighty-four

---

<sup>6</sup> There are various contrasting figures regarding the allocation of factory's production. According to Yumi (2005), military-related were not to exceed 30% during the 1970s. Moon and Paek (2010) mentioned that the ROK allocation for defence and commercial production during the same period were 70% and 30% respectively.

companies, including Korea Heavy Machinery, KIA Industries, Dawoo Heavy Industries and Lucky-Goldstar, participated as an act of patriotism. These multinational companies have become the backbone of Korean defence industry (Kim 2004: 85).

The 1970s was significant in marking both the beginnings of the ROK defense industry and an arms export strategy, as well as the period in which the ROK freed itself from complete dependence upon the US for support. Although US arms imports would remain steady through the 1970s, slightly increasing towards the end of the Park era, cash purchases for US arms by the ROK exceeded the value of US aid for the first time.

## **2.5 Role of US in Promoting Defence Industry in ROK**

The US has played a great role in the establishment of defence industry in Korea through financial assistance during the initial stage. It provided Korea with a wide range of defence related technology by means of technical data packages, manufacturing license agreements and coproduction in the framework of security technical assistance. The availability of defence technology through US security assistance was one of the key factors enabling the Korean defence industry buildup. Even though ROK adopted “Self-reliant Defence”, it only pursued for self-sufficiency in small and light weapons. ROK had a plan to rely on US for advanced sophisticated weapons which need high level of technology and huge capital investment. A close observer of the Korean defence industry in the 1980s describes Korean defence industrialization as “dependent self-reliance”. Nearly 100% of Korean defence technology originated from the US. In addition to licensed production, the early 1970s also saw the start of a technical data flow from the US to the ROK.

### **2.5.1 Advantage of the Nixon Doctrine 1969**

One key element of the Nixon Doctrine that worked to ROK advantage was the liberalisation of arms and military technology export codes that gave for ROK to greater access to sophisticated US technology than had ever been before (Nolan 1986: 28). In response to the Korean Force Modernisation Plan, during the annual US-Korea Security Consultative Meeting in 1973, the

United States formally pledged to assist Korea in developing its munitions industry. This was to be part of the compensation for reducing the US military presence. During the early 1970s, Seoul received 881 free technical data packages (TDPs) from the US in support of Korean security needs, and the ROK arms industry made use of 124 of these to establish an indigenous manufacturing base for conventional arms (Harris 1999: 60). From 1971 to 1981 the ROK received a liberal supply of licenses to manufacture, assemble, or jointly produce a considerable number of US arms products.

By the mid-1970s, ROK signed several licensed production agreements and began producing many types of US-designed weapons, including grenades, mortars, mines, and recoilless rifles. These agreements were executed with the same stipulations as those for the M-16s. A noteworthy endeavor that involved a Korean-American concern in the early 1970s was Korea-Tacoma. Korea-Tacoma has taken on the bulk of the construction of the smaller categories of warships under the country's naval program. The ROK selected Tacoma Boatbuilding Co., of Tacoma, Washington, in the early 1970s after surveying overseas naval yards for fast attack craft designs. The ROK initially purchased four missile attack boats (PSSM 5 class) from Tacoma, but subsequent purchases of four PSSM 5s and five (CPIC patrol boats) were made from Korea-Tacoma, in South Korea.

### **2.5.2 The Carter's Policy of Arms Restraint and Troop Withdrawal**

The Carter Administration's (1977-1981) policies gave Korea incentives to promote the growth of an independent production capability. The Carter Administration's troop-withdrawal plan, later canceled, served as a major impetus for President Park Chung-hee's administration to accelerate investment in heavy industries - chemicals, metals, and machinery (Lee 1992: 19). This investment was to provide the infrastructure needed for a larger defence-industrial programme. At the same time, the Carter administration provided a series of coproduction agreements as a palliative for the US withdrawal policy. These were designed to bolster Korean weapon production capabilities. They exceeded in quality and sophistication those offered during the Nixon administration. To balance potential losses resulting from the troop pullout, the US committed a substantial amount of military aid. Although it was far short of Korean requests, the

aid eased the burden on the defence budget and improved Korean force levels. In 1979, the US government approved an F-5E and F-5F jet aircraft coproduction program between Northrop and the ROK.

ROK officials outlined three elements of partnership strategy with US during the early stage of defence industrialisation. One is to develop a significant role for Korean firms as suppliers of components and parts to major US defence firms that produced in the US. This will allow American firms to retain the lead in developing advanced technology while economising on standard parts and components through sub-contracting with Korean companies. Exports are the second elements of the partnership strategy and are integral to ROK's defence industry policy. Due to the limitation of domestic market size, ROK officials felt that the defence industry has no alternative than to turn to overseas market. Technology cooperation in weapons development is the third element in ROK's partnership strategy. This will be implemented through license and coproduction arrangements, and promotion of joint R&D of new weapons or weapons-related technology. US and ROK signed a Memorandum of Understanding (MOU) on Defence Technological/Industrial Cooperation (Global Arms Trade 1989: 136).

## **2.6 ROK Defence Industry Policy in the Post-Park Chung-hee (1981-2002)**

The policy on defence industry and promotion of defence technology experienced a variety of changes under Chun Doo-hwan (1981-88). The direction of the ROK's defence industry changed course beginning in the early 1980s. Due to doubts over the economic efficiency of ROK domestic weapons production, privileged treatment of the defence industry was de-emphasised and an attempt was made to cultivate the ability for the industry to survive on its own. Investment in research and development was reduced, and purchases of weapons and defence technology from overseas increased. In addition, overall responsibility for decisions regarding weaponry shifted from the Blue House, a vestige from the President Park era, to the Ministry of National Defence. In an effort to help the defence industry survive and increase investment in US weapons technology, export of weapons to the third world was emphasised.

The ROK's second Force Improvement Program (1982-1986) began with an emphasis on arms production for export and steady purchases of US Foreign Military Sales (FMS). During this period, the ROK defence industry concentrated on producing copies of conventional foreign-made weapons and making modifications appropriate for Korea's terrain and weather conditions. This allowed for increasing levels of indigenous development and design, as well as local production of weapons. In addition, more progress was made in establishing co-production activity with foreign companies. In 1982, the ROK conducted its first flight test of a Korean Air-Northrop co-produced F-5F. Other noteworthy endeavors involved US and ROK agreements with production of helicopters.

Roh Tae-woo (1988-1992) became the President in 1988 at the time when ROK encountered new external and internal changes. The end of the Cold War, realignment of the American Security in East Asia and ROK democratic transition paved the way for a new discourse on military strategy, construction of military power, force structure and weapons system (Moon 2010: 86). Roh was a championed of self-reliant defence and had an interest in development of domestic military technology. Upon his election, Roh proposed the "*Koreanisation of Korean defence*" which called for lessening excessive dependence on the US, in response to the military transformation at the end of the Cold War.

As part of its new defence policy, the Roh, Tae-woo administration announced a "development of a long-term defense posture plan" on 18 August 1988, which is often referred to as "the August 18 plan." The plan set three major objectives: 1) To establish a more self-reliant military strategy for national survival, prosperity, and Korean unification; 2) To build military power coherent with the goal of a self-reliant defense strategy; 3) To develop a force structure that not only enhances combat readiness, but also assures a balanced development of the armed services. Although the administration's push for defense reform failed to meet the requirements of the Revolution in Military Affairs (RMA), the August 18 plan set a new standard and direction for innovation in the South Korean defense sector (Moon and Paek 2010: 121). South Korea's transition to democracy and demand for a more transparent defense policy were closely related to the publication of the Gukbang baek soh, (The National Defense White Paper), which began in 1988.



During the 1970s and 1980s ROK's defence procurement needs were framed mostly around conventional weaponry (see Table 1). They included small arms, short range artillery pieces, ammunition, rudimentary communication equipment, Hughes 500MD helicopters, F-5 E/F fighters, relatively small scale naval vessels (battleships, patrol ships and destroyers), short-and medium-range missiles (Nike Hercules SSMs, Honest John unguided tactical missiles and Hyunmoo medium range guided missiles), and armoured vehicles (US M48 (Tank), M-113 Tank, ROKIT ('88 Tank), K-2000 APC and K900 APC). Very little attention was given to assets related to RMA, a situation exacerbated by the ROK military's excessive dependence on American C4IRS assets within the framework of the ROK-US Combined Forces Command (CFC). The South Korean military was also relying on American forces for tactical data link system, tactical information communication networks, and tactical command system.

**Table 1. Major Defence Articles produced in Korea (1970s-1980s)**

<b>Types</b>	<b>Articles</b>
<i>Weapons</i>	M101A1 (105mm Howitzer), M114A2 (155mm Howitzer), M67 (90mm RR), M40A2 (106mm RR), M19 (60mm Mortar), M29A1 (81mm Mortar), M30 (4.2" Mortar), 20mm Vulcan AOS, M16 Rifle, M60 Machine Gun, K1 (5.56mm Submachine Gun), K2 (5.56mm Rifle), K5 (9mm Pistol), K3 Machine Gun
<i>Ammunition</i>	Artillery Ammunition (M107, M1, M444E1, M314A3, M106), Mortars Ammunition (M374, M329A1, M49A4), Gun & Recoilless Rifle Ammunition (M371A1, M431A2, M344A1, MK-51, K241, M456A1), Anti-Aircraft Ammunition (M246, M56A3, M220, M55A2, K154, K155, K156, K202, K203), Small Arms Ammunition (M1, M2, M193, M200, M196, M80, M62, M82), Ammunition WP Smoke (KM302A1, KM375, KM328A1, KM602A2, KM110A2, KM34), Hand Grenades (K400, K401, K409), Mines (M18A1, M19)
<i>Communications Equipment</i>	TA-312-PT, AN/PRC-77, AN/GRC-122/142, AN/VRC-12, AN/URC-87, TCC-15K (Delta Muk), TCC-7K
<i>Aircraft</i>	Hughes 500MD Helicopter, Hughes 500 MC Scout, Northrop F-5E/F fighter, F-16 engine and fuselage
<i>Naval Vessels Missiles</i>	Patrol Ship, Battle Ship, Destroyer, Landing Craft, Land Ship Tank, Munitions Supply Ship, Troop/Vehicle Transport, Submarine Nike Hercules surface to surface missile, Honest John unguided tactical missile, Hawk missile system, Anti-Ship missiles, Hyunmoo medium-range guided missile
<i>Armoured Vehicles</i>	US M48 (Tank), M-113 Tank, ROKIT ('88 Tank), K-2000 APC, K900 APC
<i>Miscellaneous</i>	M79 (Grenade Lau), M203 (Grenade Lau), AN/TVS-5, AN/PVS-5, AN/PVS- 4, M9A1 (Protective Mask), M-2 Aiming Circle, 69mm Mortar Sight, 81mm Mortar Sight, Telescope Pan, 105mm HOW Carriage, Military Trucks, Heavy Machinery Equipment

**Source: Moon and Paek 2010**

During ROK's second Force Improvement Program (1982-1986) this period, the ROK defense industry concentrated on producing copies of conventional foreign-made weapons and making modifications appropriate for Korea's terrain and weather conditions. This allowed for increasing levels of indigenous development and design, as well as local production of weapons. In addition, more progress was made in establishing co-production activity with foreign companies. In 1982, the ROK conducted its first flight test of a Korean Air-Northrop co-produced F-5F (Hutchinson 1998: 79). Korea Tacoma, a South Korean-owned subsidiary of the United States Tacoma Boatbuilding Company, produced one class of patrol gunboat and one class of landing ship for the navy. In the late 1980s, production of submarines designed by the Federal Republic of Germany (the then West Germany) was initiated.

ROK started exporting military products in 1975. In that year, the dollar value of military exports was minimal and concentrated on small items. Most of the military exports were comprised of military software – uniforms and non-lethal equipment. Some defence-related items were sold during the defence industrial build-up period from 1968-76. Defence products sold abroad during this period were mostly non-weapon supplies, such as uniforms, gas masks, tents, and some communications gear.

However, since 1976, Korea has not only increased the dollar value of its military exports, but has also shifted its exports from labour-intensive software to conventional weapons including infantry ammunitions, weapons, as well as light naval vessels. Since late 1970s ROK defence industry has exported defence equipments to countries in Middle East, Latin America and Southeast Asia (Global Arms Trade 1989: 134). During 1975-1985, Korea emerged as the third largest exporters of weapons in the Third World, including China, with a total trade value of \$2.78 billion. The largest market was in Asia (\$472), followed by Latin America and Middle East. Europe and Africa were also significant importers of Korean military hardware (Baek et al. 1989: 162).

**Table 2. Major ROK License Production Programmes**

<b>Weapon System</b>	<b>Licenser</b>	<b>Korean Producer</b>
<i>1960s</i> LCU-501 landing craft	US	Korea Shipbuilding
<i>1970s</i> CPIC patrol boat LCU- 161 0 landing craft M-16 rifle M-101 howitzer M-114 howitzer ND-500 helicopter Mulgae-class landing craft PL-2 trainer plane PSMM-5 fast attack craft Type-66 14 armored personnel carrier	US US US US US US US US US Italy	Korea-Tacoma Hyundai State Arsenal Kia Kia Korean Air Korea-Tacoma ROK Air Force Korea-Tacoma Asia Motors
<i>1980s</i> BK- 1 17 helicopter F-5 fighter Lerici-class minehunter M-109 howitzer Type-209 submarine UH- 1 helicopter UH-60 helicopter Vulcan gun	West Germany/Japan us Italy us West Germany US US US	H y u n d a i Korean Air Kangnam Sarnsung Daewoo Korea Bell Korean Air Daewoo
<i>1990s</i> F-16 fighter	US	Samsung

**Source: Bitzinger 1995**

By the mid-1970s, however, the decision was made to move cautiously into the arms export market, starting with non-lethal items first, then moving on to unsophisticated small arms and ammunition, and finally to more complex systems. In 1977, South Korean arms exports volume totaled more than \$100 million, making the ROK a leading Third World arms-exporting country. In 1978, Korea-Tacoma Marine Industries, Ltd., won a contract from Indonesia to produce four landing ship tanks. As the ROK was satisfying the bulk of their domestic conventional arms requirements by 1979, the development of an export market for ROK produced weapons helped continue production at existing facilities. As, ROK arms trade increased in the early 1980s, US began to placed certain restrictions on Seoul's exports of those arms based on American designs or containing US-made components.

**Table 3: Major ROK Co-development Programmes**

<b>Weapon System</b>	<b>Foreign Partner</b>	<b>Korean Partner</b>
Chon Ma SAM	France	Daewoo
Type- 88 Tank	US, Germany	Hyundai
KTX -2 Jet Trainer	US	Samsung

**Source: Bitzinger 1995**

The early-to-mid 1990s witnessed a greater degree of autonomy by ROK in the development of its defense industry. Obstacles still exist, however. Defense News reported that South Korea was attempting to join the Missile Technology Control Regime (MTCR) in 1995, because an earlier Memorandum of Agreement (MOA) between the ROK and US restricted the former to deploying missiles with a range of less than 180 kilometers. The MOA had been brought on because of work the South Koreans were involved with in producing an indigenous surface-to-surface missile with an expected range of 260 kilometers. Fearing arms proliferation, the US persuaded the ROK to forgo development of the missile in exchange for US defense assurances. By joining the MTCR, the ROK would be permitted to develop a missile with a 300 km. range.

Kim Young-sam (1993-1998) was the first opposition leader as well as the first elected civilian president over 30 years. Kim administration chose not to continue the policy of Roh as he considered the latter's administration as a continuation of the military regime and undertook measures to depoliticise the military, including the dissolution of Hanahoe, the dominant faction in the Korean military. Thus, the Kim administration's primary goal was to depoliticise the Korean military and consequently lower the priority of innovating military strategy, force structure, and new weapons system. To promote vital research and development of the domestic defence industry, the government itself operated five specialised research centers in the universities and government-sponsored laboratories. During the 1970s and the 1980s, ROKs defence procurement needs were framed mostly around conventional weaponry. However, during the 1990s, the defence industry aimed at manufacturing weapons based on its own technology, thus avoiding breaches in intellectual property rights while securing domestic research developments. Although the export was minimal relative to the domestic demand, the development of the weapons system in 1990s paved the way to the competitiveness of the export in 2000s.

**Table 4. Transformation of Korean Defence Industry**

Administration	Military Construction Programme/Security Policy	Modernisation Policy Goals	Defence Industry Policy
<b>Park Chung-hee (1963-1979)</b>	1st Yulgok (1974-1981)/ Self-reliant defence	Secure Minimum level defense forces	Actively foster defence industry/ ADD establishment (1970.8.16) Regulations on R&D system (1972.9) Act on special measures for defence industry (1973.2) Defense tax law (1975.7) Regulations on military materials prime cost standard (1978)
<b>Chun Doo-hwan (1980-1988.2)</b>	2nd Yulgok (1982-1986)	Compliment defence forces	Early military build-up Foster defence industry/ Regulations on defence procurement contract procedure(1982.8) Planning programming and budgeting system (1983.7)
<b>Roh Tae-woo (1988-1993)</b>	3rd Yulgok (1987-1991)/ US-ROK Alliance, Cooperation security	Lay the foundation for future forces	Early military build-up Maintain defence industry/ Enforcement of decree on special measures for defence industry(89.12) Abolition of defence tax law(90.12)
<b>Kim Young-sam (1993-1998)</b>	4th Juluk Jungbi saup (1992-1996)		Regulations on offset programme procedure (1992.1) Regulations on Specialisation and Systematisation Legislations (1993.12) Regulations on defence industry prime cost (1994.2)
<b>Kim Dae-jung (1998-2003)</b>	Force construction programme (1997-2001)	Secure self-reliant deterrent capabilities	Early military build-up Maintain defence industry/ Regulations on military acquisition management (199.1) Five year defense reform plan
<b>Roh Moo-hyun (2003-2008)</b>	Force investment programme (2002-2006)/ Cooperative self-reliant security	Secure self-reliant deterrent capabilities	Early military build-up Vitalise defence industry/ Law on defense procurement(2006.1) Abolition of act on special measures for defence industry(2006.1)
<b>Lee Myung-bak (2008-till date)</b>	Defense Industry programme (2007- )	Revitalise the export of defence industry New Economic Growth Engine	Early military build-up Vitalise defence industry/ Regulations on defence industry management(2007.10) Abolition of Regulations on Specialisation and Systematisation system(2009.1)

\* 1st Yulgok is the first phase of the armed force modernization project;

\*\* 2nd Yulgok is the second phase of the armed force modernization project.

\*\*\* 3rd Yulgok is the third phase of the armed force modernization.

\*\*\*\* 4th Juluk Jungbi saup is the armed force alignment.

**Source: Lee 2010**

Compared to previous presidents, Kim maintained a neutral position between the military and government. As a result, the defence industry policy placed top priority on domestic research development. National security could no longer be justified as a means to solve the internal security problems, under the post-cold war template, and democratisation created greater public demand for welfare and education. Noteworthy is a sharp drop in absolute defence spending from \$14.5 billion in 1997 to \$9.87 billion in 1998 (Moon 2010: 91).

In its quest to meet military requirements demanded by high-tech weapon systems, the ROK recognises an urgent need for technological improvements in its defence industry. Although it has diversified and allowed more nations to take part in filling its weapons needs, the ROK still desires defence industrial cooperation with the United States. However, in its 1997-1998 Defence White Paper, the ROK complains, "Since the mid-1980s the defense industry has faced great difficulties mainly due to the evasion of technological transfer by the US." To counter this, it appears the ROK has attracted competition from US defence contractors, and then settled on a particular contractor depending on the level technology transfer agreed upon as an offset deal.

Kim Dae-jung (1998-2002) took office on February 25, 1998, in the midst of the economic crisis that hit South Korea in the final year of Kim Young-sam's term. He vigorously pushed economic reform and restructuring recommended by the International Monetary Fund, in the process significantly altering the landscape of South Korean economy. Under the new provision the foreign contractor is required to provide assurances in advance that the proposed technologies will be approved for transfer to Korea prior to the approval of the offset contract. US technology transfer is subject to approval of the US Government, and US industry has no legal basis to provide those assurances. This has been a trend of changing offset requirements in the middle of competitions. The AH-X and F-X competitions started at 30% and were raised to 50% and 70% respectively in the middle of the competitions. The defence companies too suffered a serious crisis and therefore the defence production was severely affected. As a result, the government was forced to cut down its budget for defence spending.

And apart from the financial crisis, following the successful conclusion of the June Summit 2000 between the North and South Korea, public support for defence spending has also eroded.

However, in view of the low level of the military technology, Kim administration felt an urgent need to strengthen the efficiency of defence industry, primarily concentrating on new technologies. As a result, the administration restructured the ADD to a specialized research center in 1999 and launched the civilian-military jointly operating technology center to encourage salutary domestic research capabilities. Furthermore, the administration maintained the defence-related R&D investment around 5% and established the goal which secures the 10% by 2015.

The Revolutionary in Military Affairs (RMA) began to draw the attention of Korean defence planners and the C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) emerged as a top priority in budget allocation. During this period, the army, navy, and air force acquired the C4I system, which transformed their communication network system from analogue to digital mode through the introduction of the Spider network system (Moon 2010: 93). In 1998, however, the Korean government introduced a law for the promotion of civilian-military dual use technology in order to facilitate domestic R&D acquisition, especially for RMA. In January 1999, the government amended the existing Special Law on the Defence Industry to encourage participation in the defence industry by technologically more specialised firms. The ROK Ministry of National Defence (MND) reformed its acquisition process in early 2001 and implemented many of these changes in 2002 in its pursuit of new major defence acquisitions.

In addition to effectively demonstrating the benefits of its streamlining of the process, MND has shown a willingness to explore new acquisition options that incorporate the best aspects of both the direct commercial contracting and United States Foreign Military Sales methods of acquisition. New hybrid acquisition approaches such as the one being considered for the SAM-X programme permit greater cost transparency and benefits for the Republic of Korea while providing increased flexibility by the United States Government and industry to work more effectively together in responding to Korea's defence and industrial offset needs. Opportunities continue to exist to improve the decision making process and make it less susceptible to the influence of Korean representatives and political forces inherent in multinational competitions although much progress has been realised this past year in this difficult area.

## **2.7 Achievements of ROK's Indigenisation of Defence Production till the Early 2000s**

A remarkable progress in indigenisation of defence products in ROK was witnessed from the late 1990s. The end of Cold War opened the door for ROK for diversification of technological cooperation. In view of the past restriction of US technological transfer to US, ROK wanted to lessen its heavy dependence on US. No longer constrained by years of traditional bipolar arrangements and treaties, the ROK found itself in a better position to view internal weapons development and procurement issues with a sharper focus on national interest.

By 1990 South Korean companies had army contracts to produce tanks, self-propelled and towed field guns, two types of armored vehicles, and two types of helicopters. A division of Hyundai produced the 88 Tank (commonly called the K-1 tank) at Changwon. The K-1 was the result of a joint US-ROK design. The K-1 Tank's 105mm gun was an improved version of the same caliber gun that was standard on South Korea's M-48A5 tanks. Although a few components of the tanks' fire control and transmission systems were imported, Hyundai and South Korean subcontractors manufactured most of the systems. One of the Samsung Group's businesses produced 155mm M-109 self-propelled howitzers. KIA Machine Tool was the manufacturer for the KH-178 105mm and the KH-179 155mm towed field guns. The KH-178 and KH-179 guns were derived from United States-designed artillery but were considered indigenously designed. Daewoo Industries and Asia Motors had a coproduction agreement for an Italian-designed wheeled, armored personnel vehicle.

In 1990 ROK shipbuilders were building two indigenously designed naval vessels, and they had coproduction agreements with States, Italian, and German companies for several other types of ships. Three 150-ton submarines designed by the Howaldswerke Shipbuilding Corporation were in service with the navy in 1990. ROK military planners were interested in using submarines to protect critical shipping lanes from North Korean submarines in wartime. The greatest achievement in ROK naval weapon development was the production of three models of KDX-I



destroyer in between 1996 to 1998 (see Table). This was followed by the newer version of KDX-II (*Chungmugong Yi Sun-sin*) in 2002 and KDX-III in 2007.

**Table 5. Three Models of ROK Submarine: KDX-I (Gwanggaeto the Great class destroyer)**

<b>Name</b>	<b>Number</b>	<b>Builder</b>	<b>Launched</b>	<b>Commissioned</b>	<b>Status</b>
<i>Gwanggaeto the Great</i>	DDH-971	Daewoo Heavy Industries	28 October 1996	31 July 1998	Active
<i>Eulji Mundeok</i>	DDH-972	Daewoo Heavy Industries	16 October 1997	30 August 1999	Active
<i>Yang Manchun</i>	DDH-973	Daewoo Heavy Industries	30 September 1998	29 June 2000	Active

**Source: Wikipedia 2012**

There have been great achievements in defence production under Kim Dae-jung administration, which could enhance the capabilities of its weapons through the military modernisation plan from 1998 to 2002. Most of the defence procurements in 2000s were fulfilled by domestic R&D acquisition except some of air force and precision guidance weapons system (Lee 2010). There has been an increase in the volume of defence exports as well. The sharp rise in export volume since 2000s was partly a consequence of the development of the big-ticket items, including K-9 and KT-1 and international exchange for export promotion (Moon 2010: 92).

Some defence industrial firms - in cooperation with the Korean government - have been developing indigenous weapons in order to cope with restrictions on third country arms sales by the United States. For example, Samsung Techwin has been successful in developing and exporting K-9's on an indigenous basis. Production and export of the KT-1 training aircraft is another successful case. Korea has also been able to evade US restriction on exports of the KT-50 training aircraft by reaching an agreement with Lockheed Martin. Samsung Thales has also successfully exported RMA-related software through the upgrading of indigenous technology (Moon 2010: 92).

## CHAPTER 3

# Political Economy of Indigenisation of Korean Defence Production

### 3.1 Introduction

ROK's indigenisation of defence production has two main objectives – for self-reliant defence and for economic growth engine. This chapter will analyse ROK government policy on self-reliant defence programme and defence export promotion. It will highlight the various steps taken by government to use defence production as an instrument for regional power status and an economic growth engine. With the continuous growth of its economy and progress in the field of Research and Development, ROK defence industry has been able to achieve various of its targets. It has now moved into a higher level of the ladder by supplying defense products to the third world and developed countries. These achievements have been attained due to the continuous efforts of the government in the past three decades.

Though there has long been an aim for arms sales to be an instrument for earning foreign exchange as well as a diplomatic tool to developing countries, it was under Roh Moo-hyun (2003-2007) that ROK defence export achieved remarkable record. The Lee Myung-bak (2008-till date) government which came to power in 2008 aimed at “*developing the defence economy into a growth engine for the national economy.*” ROK has been successful in exporting defence products to various countries ranging from Asia, Africa to Latin America. Having attained greater role in international and as a regional player, ROK aims at expanding its market shares around the globe.

The coming of Roh Moo-hyun in 2003 has been a landmark in the history of ROK. Roh strongly advocated ROK to be a future power balancer in Korean peninsula. He also emphasised on building advanced self-reliant defence and stressed on exporting defence products for economic gain as well. Defence export increased from \$143.9 million in 2002 to \$266.8 million in 2003 and further increased to \$845 million in 2007 at the end of Roh's term in office. It reached to a remarkable record of \$1 billion in 2008 in the first year of Lee Myung-bak. ROK hits \$2.4 billion dollars in arms exports for 2011 and is targeting \$3 billion for 2012.

### 3.2 Domestic Politics of ROK's Indigenisation of Defence Production (2003-2011)

Roh Moo-hyun took office on February 25, 2003 in the midst of the second nuclear crisis, following the failure of the first high-level talks between the Bush administration<sup>7</sup> and the North Korean regime in October 2002. After the failure of Kim Dae-jung Sunshine Policy<sup>8</sup>, Roh adopted “Policy for Peace and Prosperity” to engage with North Korea. The MND released the first Defence White Paper in early July 2003 entitled “*Participatory Government Defense Policy 2003*” which chose for the establishment of “peace regime on the Korean Peninsula” as its primary objective vision on security matters. In order to achieve these goals, ROK Armed Forces designated “*Realisation of an Advanced, Self-Reliant National Defence*” as its defence policy objective (Defense White Paper 2003: 32). In a National Independence Day speech on August 15, 2003, Roh expressed his will to pave the way for self-reliant military within the next 10 years. He reaffirmed this commitment in his speech during an Armed Forces day on October 1, 2003.

The MND in its Defence White Paper 2003, among many other proposals, advocated for the localisation of development and manufacturing of weapons systems to achieve self-reliant defence, however costly and time consuming it may be. The Defence White Paper published in December 2006, the last under Roh called to “*Buildup of Elite Military Force*”, with great emphasise on localisation of defence production, development of defence R&D, and fostering defence industry. The localisation of defence production is aimed at promoting local industries and creating more jobs for the citizens. This will also give the country the advantage of selling its products without any restraints from other countries, as has been in the past several years.

---

<sup>7</sup> Bush in his State of the Union address on January 29, 2002 labeled Iraq, Iran and North Korea as “Axis of Evil” which was taken by Kim Jong-il regime as a threaten for regime change. The US-DPRK relationship has since then gone from bad to worst.

<sup>8</sup> Sunshine Policy was adopted by Kim Dae-jung government to engage with the North Korea. This Policy was discontinued when Lee Myung-bak became the president in 2008.

ROK advanced self-reliant defence plan has been greatly influenced by the decrease in birth rate. ROK has one of the lowest birth rate in the world. In order to meet the challenge of decreasing younger population, ROK planned to build sophisticated weapons, through indigenisation as well as purchasing from advanced countries, decrease down the number of military personnel. According to the Korean National Statistical Office, 20-year-old men numbered generally more than 400,000 from 1977 to 2003, which was quite sufficient to sustain the 690,000 active-duty military population that had been maintained in the 1990s. But the number is going to fall continuously after 2013 and is projected to reach 308,000 in 2020 (Bennet 2006: 4).

The Defence Reform 2020<sup>9</sup> was prepared in 2005 with an aim to build “*Advanced, Elite and Strong Forces*”. National Defence Reform Act was passed on December 2, 2006 after going through legal procedures such as public hearing. This military modernisation plan which consisted of several interlocking proposals is the third military modernisation in history of ROK<sup>10</sup>. It aims at self-reliant advanced national defence system through the creation of a technology-intensive military structure and future-oriented defence capability. Localisation of more arms production and taking advantage of “spin-on” (civilian-military) technologies is among the main proposals<sup>11</sup>. In order to establish a truly self-reliant defence capability, the Roh government stepped up domestic defence industry infrastructure by enacting the “Defence Business Act of 2006,” initiated by the presidential office.

Employment generation has also been one of the main objectives of the promotion of defence industry in ROK. Since it’s as defence industry has been found out to contribute for generating employment to its citizens. According to the data provided by government agencies, defence spending in ROK did not have any negative impact on economy; meaning defence industry has also contributed for the economic growth of the country. Roh Moo-hyun administration pledged

---

<sup>9</sup> Some authors use the term Defence Reform Plan (DRP) 2020 or Defence Reform Basic Plan 2020.

<sup>10</sup> The first military modernisation plan (Force Improvement Plan) was carried during Park’s time in 1974, while the second moved took place during Roh Tae-woo government (1988-1992).

<sup>11</sup> To increase significantly military spending - by approximately 10% a year between 2008 and 2020 - with a focus on “force improvement projects”; To reduce military manpower by approximately 25% by 2020; and to shift budget priorities from the army to the navy and air force in order to bolster rapid response capabilities.

to promote defence industry by increasing defence budget and promoting small and medium-sized enterprises. Lee Myung-bak government also believes in economic benefit of defence production. In order to use defence industry as an economic growth engine, the government is targeting creation of 50,000 jobs by 2020.

### **3.3 International Politics of ROK's Indigenisation of Defence Production**

Unlike his political supporters, who wanted to melt guns and cannons into plows, the human rights lawyer-turned-president Roh encouraged a build-up and modernisation of ROK's armed forces, to match national capabilities with the immediate North Korean threat as well as unspecified potential long-term threats. The decision was taken in the context of multiple factors, including the emerging rivalry between China and Japan, US unilateralism and questions about Washington's security commitment (evidenced by the USFK troop reduction), and ROK's growing national capability in the defence sector. This modernisation plan is also influenced by the Revolutionary in Military Affairs adopted by US after the 9/11 attack.

Roh Moo-hyun proposed for a more independent foreign policy, more independent from the control of the US. Roh pledged ROK to play a power balancer in Northeast Asian geopolitics. In his public speech on March 8, 2005, Roh stated, "*A century ago, Korea tried China, Japan and Russia as well as the United States as an ally to defend itself from imperial power politics in the region. But nothing worked and Korea had become a colony in the end*" (Rozman et al. 2008: 111). Under Roh, a strong self-defence capability was viewed as a priority for ROK's national strategy not only to survive in the rough world of Northeast Asian geopolitics but also to become a balancer in the region. ROK stopped labeling North Korea as "main enemy" in its Defence White Paper 2004 which signaled its positive move towards peace building in the peninsula. The long term preparation of ROK is focused on the post-Korean reunification.

The coming of Lee Myung-bak in 2008 has brought new light in the defence production of ROK. Apart from building "*Elite and Advanced Military*" as its defence policy, the MND in 2008 also adopted "*Defence Management as a New Economic Growth Engine*" (Defence White Paper 2008). In an effort to build "*Advanced Elite Military Forces*", the MND in its Defence White

Paper 2010 (the latest so far), also initiated a policy for “*Developing Defence Economy into a Growth Engine for National Economy*”. Korea, being a small country has to look out overseas market for export of its defence products. Lee Myung-bak adopted this policy due to the success of Korea’s long history of export promotion. Indigenisation of defence production is seen to be an opportunity to be free from other countries’ control of third-country sales. Korea has been facing export constraints from US since the 1970s when it manufactured using US license.

### **3.4 Republic of Korea’s Major Indigenous Defence Products (2003-2011)**

Roh Mo-hyun adopted indigenisation programme of defence product to be more self-reliant in defence and to promote local defence contractors. Apart from purchasing costly jet fighters like F-15K and F-16, Roh Moo-hyun administration continued the indigenisation of defence production of K-9 Self-propelled Artillery, K1A1 Tank, KDX-I, KDX-II, KDX-III, 214-class Submarines (KSS-II or Jangbogo-II), Landing Platform Experimental (LPX), and proposed to launch new projects like manufacturing Patrol Killer Experimental (PKX), KP-SAM Shin-Gung (or Chiron) missiles, military satellite communication equipment, landing-attack armoured vehicle, GOP scientific alert system, next-generation escort vessel, air-to-surface guided missile, and mass production of T-50 Golden Eagle advanced jet trainers. In order to overcome the quantitative advantage of North Korean armed forces<sup>12</sup>, ROK planned to develop qualitative improvements in forces concerning surveillance, intelligence and precision air-strike (Defence White Paper 2003, 2006).

The Lee Myung-bak administration has followed the weapons indigenisation policy of Roh Moo-hyun by supporting the production of sophisticated advanced weapons. In order to secure advanced combat capabilities, new weapons projects like Next Infantry Fighting Vehicle, Improvement of Anti-artillery Detection Radar, Next Landing Ship Tank, Joint Air to surface Stand-off Missile (JASSM), Korean Utility Helicopter, improving the performance of K-55 Self-propelled artillery, improving the performance of the C-130H were undertaken. The budget for Financial Year (FY) 2008 increased by 8% from the preceding year. A total of 170 ongoing

---

<sup>12</sup> According to *The Korean Military Balance 2011* published by Centre for Strategic and International Studies, North Korea has military strength of 1,190,000 (Army-102,000, Air Force-110,000, Navy-60,000), while ROK has only 655,000 (Army-522,000, Air Force-65,000, Navy-68,000)

programmes were carried out and 30 new programmes were launched in 2008. The total number of programmes undertaken in 2010 was 184, while 25 new programmes were launched in the same year (Defence White Paper 2008, 2010). In order to secure long-range precision capability, MND pursued various programmes to acquire advanced forces including the following: K-9 self-propelled artillery, large caliber MLRS (munitions), Gwanggaette (KDX-III)-class destroyers (Aegis) and Jangbogo-II.

**Table 6. Defence Contractors and Their Major Specialisations**

Major Defence Contractor [ <i>Parent Company</i> ]	Products & Primary Area of Specialisation
LIG Nex1 [ <i>LG Group</i> ]	Electronic warfare systems, C4ISR, missile technologies, precision-guided munitions, underwater surveillance systems, radar systems
Hyundai Heavy Industries [ <i>Hyundai</i> ]	Shipbuilding (frigates, destroyers, submarines) and related components
Hyundai Rotem Company [ <i>Hyundai</i> ]	Main battle tanks (MBTs) including K1A1 and K2
Doosan DST [ <i>Doosan</i> ]	Armoured vehicles (e.g. K21 IFV), air defence systems (anti-aircraft cannons, surface-to-air missile systems)
Korea Aerospace Industries	Fixed- and rotary-wing aircraft, aircraft components, aviation technologies
Daewoo Shipbuilding and Marine Engineering [ <i>Daewoo</i> ]	Shipbuilding (frigates, destroyers, submarines) and related components
Samsung Techwin [ <i>Samsung</i> ]	Self-propelled howitzers and artillery (e.g. K9 and K55), ammunition resupply vehicles
Samsung Thales [ <i>Samsung/Thales</i> ]	C4ISR, radar systems, avionics, electronic warfare systems, naval combat management systems
STX Engine [ <i>STX</i> ]	Diesel engines for naval surface combatants (e.g. KDX-II destroyers), MBTs (K1A1, K2) and other armoured units (e.g. K9)
Hanhwa Corporation [ <i>Hanhwa</i> ]	Missile technologies, precision-guided munitions, underwater sonar and surveillance systems

**Source: Korkmaz and Rydqvist 2012**

Continued efforts were also made to improve outdated weapons and artillery radar. Efforts to improve air defense were continued by fielding short range anti-air missiles, next surface to air

missiles (SAM-X), and newly deployed decontamination vehicles in 2008. In 2010, MND planned to launch new projects for a heavy attack helicopter and the Korean attack helicopter, and Boramae, outdated and obsolete combat weaponry will be upgraded. The Army undertook improve its K-1/K1A1 Tanks, K-200 Armored Vehicles, and K-277 Armored Command Vehicles, K-55 Self-propelled Artillery, and counter-battery detection radars. The Navy also undertook a planned to improve the submarine warfare capabilities of its surface combatants beyond the patrol combat corvette (PCC) level. The designed for these weapons are mainly undertaken by ADD and productions are carried out by different chaebols (see table 5).

### **3.4.1 ARMY**

The major indigenous defence production of ROK Army during the period 2003-2011 include, K1A1 Main Battle Tank, K2 Black Panther, K21 Infantry Fighter Vehicle, K-9 Thunder, K-10 Ammunition Resupply Vehicle and Shin-Gung Missile.

#### ***Tanks***

##### **K1A1 Main Battle Tank**

The K1A1 is an upgraded version of the K1 MBT, the K1, which has been operational in the ROK Army since 1986 and is known as the Republic of Korea Indigenous Tank (ROKIT). Following early design work based on US M1 technology, the K1 tank was designed and produced by Korea. K1A1 is developed by Rotem (part of the Hyundai group) which has also developed the K1 series of vehicles, which includes the K1A1 120mm main battle tank, the K1105 mm main battle tank, K1 ARV armoured recovery vehicle, and the K1 AVLB armoured vehicle launch bridge. The vehicles are built at Rotem's automated production facility at Changwon. The K1A1 was accepted into Korean service on October 13, 2001, after the first one was produced on April 3, 1996 and is an upgraded version of the K1 MBT. The KM68 main gun has been replaced with the KM256 120 mm main gun (a licensed production model of the US). First major enhanced variant of 484 units were built between 1999 and 2010.



K1 MBT



K1A1 MBT



XK2 MBT



K-9 Thunder



KIFV K200 Series



K-SAM Pegasus



K-30 Biho series



Shingung



**Source: Innovation Norway 2008**

## Black Panther

This main battle tank is developed to replace most of the various models of M48 Patton tanks and complement the K-1 series of main battle tanks currently fielded by the Republic of Korea. Full-scale mass-production is currently on hold due to concerns regarding its transmission and main engine. The K-2 Black Panther features state-of-the-art technology and is certified as the world's most expensive tank by Guinness World Records, costing over US\$8.5 million per unit. ADD designed this tank from 1995 and was ready for production in 2006, following 11 years in development and a research budget expenditure of approximately US\$230 million, and entered production phase on March 2, 2007 in Changwon. In April 2012 DAPA announced that due to ongoing issues with the reliability and durability of the domestically-produced power pack, the first 100 production K-2s would use a German engine and transmission and that service entry would be delayed until March 2014 (Korea Times, April 2, 2012).

**Table 7. The ROK Indigenous Production Tanks**

Vehicle	Type	In service	Manufacturer/Produced	Notes
K1A1	Main Battle Tank	484	Hyundai Rotem/(1999-2010)	
K2 Black Panther	Main Battle Tank	At least 3	Hyundai Rotem/(2011- )	397 planned to replace the K1A1 which replace K1. K1 replace M48A3/A3K & M48A5/A5K.

**Source: Wikipedia 2012**

## *Armoured Vehicles*

### **K21 Infantry Fighting Vehicle**

Designed by ADD, K21 was finally deemed production-ready in 2009, following 10 years in development and a research budget expenditure of approximately USD \$80m. Under mass production programme Doosan Company has undertaken a target to produce 900 K21 to assist the existing 60 vehicles. More than 85% of the vehicle's design is domestic. A replacement for the K200<sup>13</sup>, South Korean series infantry fighting vehicles is currently being tested, designated as K300 or XK21 KNIFV (Korea Next-generation Infantry Fighting Vehicle). It is designed to effectively defeat other IFVs as heavily armed and armored as the BMP-3.

## *Self-propelled Artillery*

### **K-9 Thunder**

The K-9 Thunder, a self-propelled 155 mm. howitzer is designed and developed by Samsung Techwin during 1989-1999 for the ROK Armed Forces. It was developed to supplement and eventually replace the K-55<sup>14</sup> self-propelled howitzers currently in South Korean service. K-9 howitzers operate in groups with the K-10 automatic ammunition resupply vehicle. Production was started in 1999 and continues till date. The power pack consists of the German-designed MTU MT 881 Ka 500 V8 water-cooled diesel developing 1,000 hp, coupled to an Allison Transmission Division X1100-5A3 fully automatic transmission with four forward and two reverse gears. This transmission is a further development of that installed in the General Dynamics Land Systems M1 series of MBT.

---

<sup>13</sup> A total of 2,383 K200 vehicles of all configurations were produced between 1985 and 2006, among which 111 K200A1 vehicles had been exported to Malaysia.

<sup>14</sup> K55/K55A1 is an American-made self-propelled howitzer which is a variant of the M109, originally based on M109A2 with additional domestic augmentations, license-produced by Samsung Techwin.

## **K-10 Ammunition Resupply Vehicle**

The K-10 is an automatic ammunition resupply vehicle built on the K-9 platform, part of the K-9 Thunder system. It shares the same chassis as K-9, preserving K-9's mobility, and can follow the main artillery battery without lagging behind. The K-10 covers the requirements of substantially increased amount of ammunitions in the warfare to the K-9 to meet its tactical requirements of higher firing rate, shoot and scoot. The vehicle is powered by German MTU MT 881 Ka-500 diesel engine, developing 1000 horsepower. The K-10 ARV uses the same engine as K-9. In 2001, Korea's Samsung Techwin was awarded a full-scale development contract for XK10 and started the manufacturing in 2006.

**Table 8. Self-propelled Artillery**

<b>Artillery</b>	<b>Type</b>	<b>In service</b>	<b>Manufacturer/Produced</b>	<b>Notes</b>
K-9 Thunder	155mm Self-Propelled Howitzer	532	Samsung Techwin/ 1999–present	Total 1,136 will be delivered until 2018
K10 ARV	Ammunition Resupply Vehicle	At least 18	Samsung Techwin/2006-	Total 179 will be delivered

**Source: Wikipedia 2012**

## **Missiles**

### **Shin-Gung**

The KP-SAM Shin-Gung or Shin-Kung is a shoulder launched surface-to-air missile manufactured by LIG Nex1. It is marketed internationally as the Chiron. The Shin-Gung was created to protect ROK troops in the forward area, which started in 1995 under the direction of NEX1 Future Company Ltd. The KP-SAM began production in 2004 with extended trials in early 2005. In late 2005, the KP-SAM Shin-Gung entered service with the ROK Army, after being in development for nearly 8 years. The ROK Army has ordered some 2000 units to be delivered in the near future.

While the missile system externally resembles a French Mistral system, the seeker itself is based on Russian technology with the control section, warhead and motor made in ROK. The missile features integrated IFF systems, night and adverse weather capabilities, a two-colour (IR/UV) infrared seeker to aid in negating infrared countermeasures (IRCM) and a proximity-fuse warhead. During development tests the missile scored a 90% hit ratio. According to Agency for Defense Development officials, the missile is superior to the American FIM-92 Stinger or the French Mistral in hit probability, price and portability

### **3.4.2 NAVY**

The major indigenous weapons of ROK Navy include Future Frigate eXperimental, Korean Destroyer eXperimental (KDX) –II, KDX-III, Dokdo Class Amphibious Assault Ship (LPX), Patrol Killer Vessel, Korean Attack Submarine Programme (KSS)-III and Jangbogo Upgrades.

#### **Future Frigate eXperimental (FFX)**

The Incheon class frigates also known as Future Frigate eXperimental (FFX) during development, are coastal defence frigates of the ROK Navy. The lead ship was launched on April 29, 2011. The Incheon class frigates will replace the aging fleet of Pohang class corvettes<sup>15</sup> and Ulsan class frigates<sup>16</sup>, and take over multi-role operations such as coast patrol, anti-submarine warfare and transport support. Later batches are planned to be specialized on anti-air and anti-submarine warfare. The construction of the first FFX frigate was awarded to Hyundai Heavy Industry in 2010 and in April 2011 the first of its class, ROKS ‘Incheon’ was launched. The ship is named after the western port city of Incheon, representing the ROK Navy’s initiative to defend the western islands due to the constant clashes with the North Korean navy in this area. This new frigates will be equipped with anti-air defence and helicopter landing capabilities.

---

<sup>15</sup> The Pohang class corvette is a class of general purpose vessels operated by the ROK Navy. They have served in a coastal defence role during the late Cold War and post-Cold War period. A total of 24 Pohang-class vessels were built, all constructed in South Korea. Currently, 21 vessels remain in service.

<sup>16</sup> The Ulsan class frigate is a class of multi-purpose Guided Missile Frigates built by ROK. Presently they are in use with ROK Navy and Bangladesh Navy.

### ***Korean Destroyer Experimental (KDX-II)***

#### **Chungmugong Yi Sun-sin Class Destroyers**

Chungmugong Yi Sun-sin class destroyers are multipurpose destroyers of the Republic of Korea Navy. The lead ship of this class, ROKS Chungmugong Yi Sunshin, was launched in May 2002 and commissioned in December 2003. Chungmugong Yi Sun-shin class destroyers were the second class of ships to be produced in the Republic of Korea Navy's destroyer mass-production program named Korean Destroyer eXperimental, which paved the way for the navy to become a blue-water navy. Six ships were launched by Hyundai Heavy Industries and Daewoo Shipbuilding & Marine Engineering in four years. The KDX-II is part of a much larger build up program aimed at turning the ROK Navy (ROKN) into a blue-water navy. It is said to be the first stealthy major combatant in the ROKN and was designed to significantly increase the ROKN's capabilities. The other classes of this model are: Munmu the Great, Dae Jo-yeong, Wang Geon, Gang Gam-chan and Choe Yeong. All of them are named after the great personalities of Korean history.

### **Korean Destroyer Experimental (KDX-III)**

The Sejong the Great class destroyers (Sejongdaewang-Ham), also known as KD-III, are guided missile destroyers of the Republic of Korea Navy. The lead ship was launched May 25, 2007, sponsored by Kwon Yang-sook, the First Lady of the Republic of Korea at the time and was commissioned in December 2008. The second ship was commissioned in August 2010. As of 2010, the ROK Navy has committed itself to deploy three ships with an option for three more.

The Sejong the Great class is the third phase of the Republic of Korea Navy's Korean Destroyer eXperimental (KDX) program, a substantial shipbuilding program, which is geared toward enhancing ROKN's ability to successfully defend the maritime areas around Korea from various modes of threats as well as becoming a blue-water navy. At 8,500 tons standard displacement and 11,000 tons full load, the KDX-III Sejong the Great destroyers are by far the largest destroyers in the Republic of Korea Navy, and built slightly bulkier and heavier than Arleigh Burke class destroyers or Atago class destroyers to accommodate 32 more missiles. KDX-III are

currently the largest surface warfare ships to carry the Aegis combat system. The other classes of this ship are: Yulgok Yi I and Seoae Yu Seong-ryong, which are taken from the names of great personalities of Korean history.

KDX-III (7,000 ton Destroyer)



KDX-II (4,500 ton Destroyer)



KDX-I (3,000 ton Destroyer)



KSS-II (214 Submarine)



KSS-I (209 Submarine)



LPX (Dokdo)



PKX



**Source: Innovation Norway 2008**

### **Dokdo Class Amphibious Assault Ship (LPX)**

ROKS Dokdo (LPH 6111) is the lead ship of the “Landing Platform eXperimental” class of amphibious landing ships of the Republic of Korea Navy, launched on July 12, 2005 at the shipyard of Hanjin Heavy Industries & Constructions Co. in Busan. Designed by Hanjin Heavy Industries, the requirements for the amphibious landing ships were to enhance Korea's current amphibious operation capability, both in terms of assault and military operations other than war (MOOTW) type operations.

The ROKS Dokdo is also the largest helicopter landing ship in Asia, with one of the fastest maximum speeds in the world in regards of heavy amphibious assault ships. The ROKN needed a versatile landing ship with amphibious capabilities in its program to build a blue-water navy. In the end Hanjin’s Dokdo design was chosen for this need. LSF-II 631-also built by Hanjin- was chosen as the LCAC to operate from the ship.

## **Patrol Killer Vessel (PKG)**

Gumdoksuri class patrol vessel also known as PKG class patrol vessel is a patrol ship of the Republic of Korea Navy. Two variants are planned. The first being PKG-A or Yun Youngha class missile patrol ship, and the second being PKG-B class patrol boat. The ROK Navy began development of the PKG class in 2003 after a Chamsuri class (PKM class) patrol boat was sunk during a naval clash with North Korean patrol boats on June 29, 2002. The codenamed PKX (Patrol Killer eXperimental) program is the patrol boat modernisation project of the ROK Navy.

## ***Korean Attack Submarine Programme (KSS)***

### **KSS-III**

KDX-III is the third part of the ROK submarine programme which began in 2007. This class will have significant improvements when compared to its predecessors –KDX-I and KDX-II. A total of nine 3,000-ton KSS-III submarines are expected to be built in South Korea with indigenous technologies. In May 2009, ROK decided to delay by two years its KSS-III project. The project is expected to cost around \$800 million (597 million Euros). The first KSS-III ship will be ready for service by 2022. The previous plan was to have an operational unit ready by 2017.

Due to the relatively heavy displacement of the ship (3000-3500 tons) and the fact that it will be built with local Korean technologies (sensitive technologies might be blocked from export) this new class of ship will have the Vertical Launch System, the first submarine in the Republic of Korea Navy to have this kind of capability. It will also have many other improvements compared to its predecessors. Since the class is still at an early stage of development as stated above there are many competing designs for the class, mainly the Diesel-electric powered version and the Nuclear powered version.

## **Origin**

The Korean Attack Submarine programme, KSS meaning Submarine, is a three-phased project to build up the Republic of Korea Navy (ROK Navy)'s submarine arsenal. Before the KSS

programme, the submarine fleet of the ROK Navy consisted of midget submarines, such as the Dolgorae class submarine and SX 756 Dolphin class submarine, which had limited capabilities for inshore operations. The KSS programme sought to acquire submarines that can deter hostile submarines and surface ships; protect friendly naval bases and sea shores communications; carry out reconnaissance missions. Through the first phase, KSS-I, the ROK Navy acquired nine 1,200-ton Chang Bo-go class submarines. For the second phase, KSS-II, the ROK Navy plans to acquire nine 1,800-ton Type 214 submarines equipped with Air-independent propulsion (AIP) the lead ship of her class. Both KSS-I and KSS-II were produced under license production.

### **Jangbogo Upgrades/Variant**

The South Korean Jangbogo-class submarines have reportedly been heavily upgraded in the 21st century, which if undertaken was supposed to include domestic hull stretch augmentation from 1,200 tons to 1,400 tons and installment of domestically developed Torpedo Acoustic Counter Measures (TACM). Some upgrades could have been affected or altered due to Korean economic problems of the late 1990s, which modified other plans to acquire nine 1,500-ton AIP-equipped boats or upgrade six 1200 boats to 1,500-tons AIP-equipped boats, although the more ambitious plan to acquire nine 1,800-ton Type 214 AIP submarines was preserved and put under progress, not unaided by the quick recovery of the South Korean economy in 1999, which will reportedly be wrapped up in 2018 when all submarines of the type are scheduled to be commissioned.

LIG Nex1 began producing TACM for unspecified submarine types of the ROKN as well, which finished development in 2000. Outfitting of the submarines with Sub-Harpoon launching capability was a part of the upgrade. They can equip the White Shark heavy torpedo, and can possibly equip submarine-launched Hae Sung anti-ship missiles later on. AIP and flank-array sonars are planned for future modernisations.

### **3.4.3 AIR FORCE**

The major indigenous aircrafts for ROK Air Force include T-50 Advanced Trainer, which is the first indigenous aircraft, A-50, improved version of T-50 and KF-X.



## **T-50 Advanced Trainer (First Indigenous Aircraft)**

The T-50 Golden Eagle is a family of South Korean supersonic advanced trainers and multirole fighters, developed by Korea Aerospace Industries beginning in the late 1990s. The T-50 is ROK's first indigenous supersonic aircraft and one of the world's few supersonic trainers. It took its maiden flight in 2002 and entered active service with the Republic of Korea Air Force in 2005. The T-50 advanced trainer had been further developed into aerobatic and combat variants, namely T-50B, TA-50, and FA-50. Ten T-50B serve with the South Korean air force's aerobatics team. In 2011, the first squadron of TA-50, T-50's light attack variant, had become operational. The maiden flight of FA-50, T-50's multirole fighter variant with comparable capabilities to KF-16, had also taken place in 2011. First FA-50 production for 60 aircraft will commence in 2013 until 2016.

### **Origin**

The T-50 program was originally intended to develop an indigenous trainer aircraft capable of supersonic flight, to train and prepare pilots for the KF-16 and F-15K, replacing trainers such as T-38 and A-37 that were then in service with the Republic of Korea Air Force. Prior South Korean aircraft programs include the propeller-driven KT-1 basic trainer produced by Daewoo Aerospace (now part of KAI), and license-manufactured KF-16. In general, the T-50 series of aircraft closely resembles the KF-16 in configuration.

T-50



A-50



## **Improved Versions of T-50**

The programme has expanded beyond a trainer concept to include the TA-50 light attack aircraft, as well as the FA-50 multirole fighter comparable to KF-16. The TA-50 variant is a more heavily armed version of the T-50 trainer, intended for lead-in fighter training and light attack roles. Equipping the EL/M-2032 radar, the TA-50 is designed to operate as a full-fledged combat platform for precision-guided weapons, air-to-air missiles, and air-to-ground missiles. TA-50 can mount additional utility pods for reconnaissance, targeting assistance, and electronic warfare. Reconnaissance and electronic warfare variants are also being developed designated as RA-50 and EA-50.

The FA-50 is the most advanced version of the T-50. It equips a modified Israeli EL/M-2032 pulse-Doppler radar with further Korean-specific augmentations by LIG Nex1, and has more internal fuel capacity, enhanced avionics, a longer radome and a tactical data link. The augmentations increased the range of the EL/M-2032 on FA-50 by two-third compared to the same radar on TA-50.

## **KAI KF-X**

The Korea Aerospace Industries KF-X is a South Korean program to develop an advanced multi-role fighter for the Republic of Korea Air Force (ROKAF) and Indonesian Air Force (TNI-AU), spearheaded by ROK with Indonesia as the primary partner. It is ROK's second fighter development programme following the FA-50. The project was first announced by South Korean President Kim Dae-Jung at the graduation ceremony of the Air Force Academy in March 2001. ROK and Indonesia had agreed to cooperate in the production of KF-X warplanes in Seoul on July 15, 2010. The initial operational requirements for the KF-X program as stated by the ADD were to develop a single-seat, twin-engine jet with stealth capabilities beyond either the Dassault Rafale or Eurofighter Typhoon, but still less than the Lockheed Martin F-35 Lightning II. The overall focus of the program is producing a fighter with higher capabilities than a KF-16 class fighter by 2020.

## **Design and Development**

According to the Weapon Systems Concept Development and Application Research Center of Konkuk University, the KF-X is intended to be superior to the KF-16, which would replace ROK's aging F-4D/E Phantom II and F-5E/F Tiger II aircraft, with production numbers estimated to be over 250 aircraft. Compared to KF-16, the KF-X will have a 50% greater combat radius, 34% longer airframe lifespan, better avionics including a domestically produced AESA radar, and better electronic warfare,IRST, and data link capabilities. Operational requirements also specify approx 50,000 pounds of thrust provided by one or preferably two engines, high-speed interception and super cruise capabilities, basic stealth technology, and multirole capabilities. There are currently two competing designs for the KFX, the KFX-201 which has a tri-plane layout with canards and a more conventional, Single Engine F-35 style KFX-101 design.

ROK will fund 60% of the aircraft's development, and expects foreign partners to provide the remaining 40% of the development funding. ROK possesses 63% of the necessary technology to produce the KF-X, and is therefore seeking cooperation from Indonesian Aerospace, Turkish Aerospace Industries, Saab, Boeing, and Lockheed Martin to develop the KF-X. About 120 KF-Xs would be built initially and more than 130 aircraft would be produced additionally after the first-phase models reach operational capability. The cost of each KF-X aircraft is estimated to be roughly \$50 million plus.

### **3.5 Improvements in Defence R&D Policy and Research Environment**

ROK investment for defence R&D is still quite compared to other advanced countries. The overall level of Korean defence science technology is evaluated at 78% relative to that of advanced countries, such as the US, UK and France (Paek 2010). MND greatly felt that ROK establish a new policy for attaining strong defence R&D. To respond to the challenges of the 21<sup>st</sup> century and to achieve defence policy objectives, the MND also called for policy improvement of R&D and defence industry. MND sought to encourage defence manufacturers to increase

investment on R&D so that they can domestically develop technologies as well as raise their technology level.

MND is trying to improve the R&D policy and research capabilities regarding high-tech military so as to acquire the necessary R&D capabilities. As a measure to solidify the foundation of defence industries and R&D, the acquisition of various weapons systems from abroad is to be minimised. The promotion of domestic R&D will receive priority while active efforts will be made to meet the requirements to facilitate localisation of imported parts and promotion of future export. On the other hand, efforts will be concentrated on the promotion of the domestic defence industry, encouraging domestic research for advanced weapons, and replacing the weapons parts produced from abroad with domestically produced ones (Defence White Paper 2003: 73).

### **3.5.1 Creation of DAPA and its Contribution to Defence R&D**

On January 2, 2006, the Defense Acquisition Program Administration (DAPA) was created within the Ministry of National Defence (MND), as a streamlined military procurement agency, replacing the former Defense Procurement Agency (DPA). This independent government agency is in charge of ROK's procurement and sales of military equipments. The new agency was formed in order to ensure transparency in the defence procurement process and consolidates eight organisations that were responsible for procurement and the development of technology that were formerly under the purview of the Ministry of National Defence and the separate military services. The DAPA supports the plans of building strong, elite and advanced military forces by providing state of the art equipment and material in a timely and effective manner.

Though DADA is established mainly for transparency of defence procurement and efficiency, it also plays a great role in the defence R&D by rendering financial and technical support. DAPA has achieved a remarkable success in promoting defence industry and also helps the government in improving the quality of defence products. DAPA has played a great in the development of modern weapons like, Korea next-generation rifle (K-11), Self - propelled howitzer (K-9), Black Panther (K-2), Next-generation advanced trainer (T-50), Pride of domestic product (KT-1 'Ungbi'), The crystal of state of the art military science, (Aegis Destroyer), (Dokdo),

Hongsangeo (Red Shark), Cheongsangeo (Blue Shark). These are mainly indigenous products designed by ADD and produced by different companies. However, DAPA has also taken part in the acquisition and quality upgradation of the products.

### **3.5.2 Contribution of DTaQ to Defence R&D**

Defense Agency for Technology and Quality (DTaQ) was established during Roh Moh-hyun's administration under the DAPA. Its main purposes are; quality assurance of military supplies and planning, research analysis and evaluation of defence science and technology for future weapon system development. This is another achievement in the history of ROK defence R&D development. DTaQ is funded by DAPA to enhance transparency in the field of acquisition. The purpose of the agency is to conduct more systematic planning, analysis, evaluation and information management pertinent to defence science and technology, as well as to perform quality assurance for acquisition of excellent defence material in order to establish a basis of future military power. As a professional research organisation for the entire process of the acquisition of weapon systems, DTaQ is dedicated itself to: providing quality assurance for the acquisition of high-quality military supplies; proposing a path forward for future defence technology regarding R&D efforts and core technology development, and; undertaking integrated management service in defense science and technology (DTaQ 2012).

DTaQ is also responsible for various other missions, including analysis and support of military capability improvement projects, evaluation of defense R&D projects, operation of parts localization project, defense mark certification system, civil and military standards unification projects, international quality assurance cooperation and field support activities. In addition, DTaQ is operating Defense Venture Center to invite small and mid-sized businesses to the defense industry and to offer more opportunities to industries, academia and researchers to take part in defense-related R&D programs, contributing to strengthening Korea's civil and military science & technology power. In addition, DTaQ is operating six Defense Venture Centers – Seoul (Combat Material), Daejeon (Ammunition), Daegu (Missiles & Electronics), Sacheon – (Aerospace System), Changwon (Land System), Busan (Naval System) -to invite small and mid-sized businesses to the defense industry and to offer more opportunities to industries, academia

and researchers to take part in defense-related R&D programs, contributing to strengthening Korea's civil and military science & technology power.

DTaQ has established an international quality cooperation system through the signing of quality assurance arrangements with 18 nations including the US, UK and Germany. As of February 2008, DTaQ has 505 staffs including 55 active duty officers. Its annual budget in 2008 is \$58 million (Innovation Norway 2008).

**Table 9. DAPA Manpower**

<b>Workforce</b>	<b>Total</b>	<b>DAPA</b>	<b>DAPA Funded ADD</b>	<b>Institutions DTaQ</b>
Total	4,748	1,666	2,522	560
Civilian	826	826	-	-
Sub-total	938	840	43	55
Army	382	336	24	22
Navy	277	252	8	17
Air force	279	252	11	16
Researcher	2,984	-	2,522	505

**\*Balanced ratio between officers & civilians, and between armed forces.  
Military : Civilian = 51 : 49. Army : Navy : Air Force = 4 : 3 : 3**

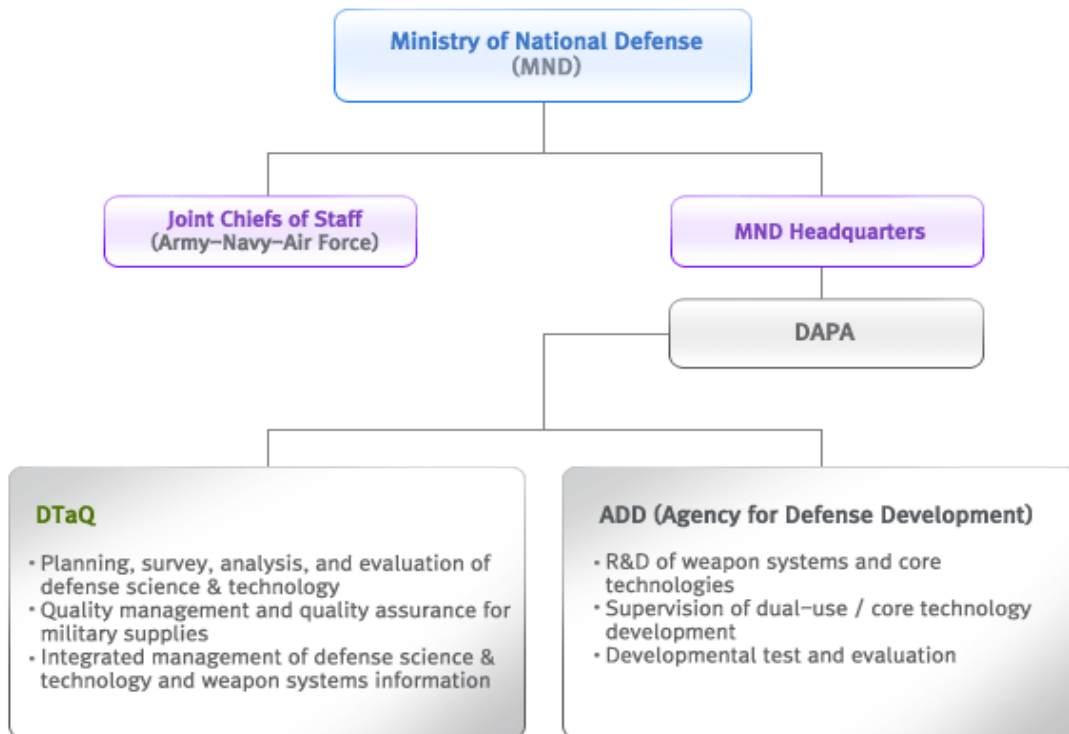
**Source: Innovation Norway 2008, Kim 2009**

The establishment of DAPA is a landmark in the history of Korean Defence, as this broke the old tradition of the defence procurement from the control of military personnel to civilian control. The transparency of information made the general public more aware of sales and purchase of the defence industry, and thus give the confidence to them. The abolition of Specialisation and Departmentalisation System, which virtually limited non-defence companies' participation in the defence sector in 2008 has opened new era of competition among defence companies (Lee 2010). In the past, only a few companies were allowed to participate in Defence R&D, but now, any company with the technology can do business in the defence area. To minimise confusion

and adverse effects resulting from the elimination of the system, DAPA has prepared comprehensive follow-on measures.

As of February 2008, DAPA has a total of 1,666 staffs, comprising of 826 civilians and 840 active duty officers (336 from ROKA, 252 from ROKN and 252 from ROKAF). The DAPA annual budget for the year 2008 is \$10.4 billion, which is equal to 37% of ROK defence budget (Innovation Norway 2008).

**Table 9. ROK National Defence System**



**Source:** Ministry of National Defense, ROK

### 3.5.3 Diversification of the Role of ADD to Promote Private R&D

The creation of DAPA in 2006 has greatly changed the role of ADD, which was once the sole R&D institution funded by the government. Unlike its initial years, ADD is now given a role to

concentrate on the development of core technologies, whereas private defence contractor are given a role to develop general weapons systems. The role of ADD as ROK's main provider of defence R&D is diminishing, at least compare to its role a decade ago (Korkmaz and Rydqvist 2012: 74).

However, even though its role is being progressively reduced, the ADD still maintains the most advanced defence R&D capabilities owing not only to its long-standing monopoly and experience in the sector, but also due to its access to advanced research facilities which have been built and maintained over the course of its existence. ROK is now actively seeking more to produce defence material acquired its own research development. The major defence industrial contractors are becoming more engaged in R&D-related activities, partly as a measure to mitigate their dependence on the often criticised capabilities of ADD, and partly as a way to increase their competitiveness on the domestic and international arms market.

#### **3.5.4 Improvements in Defence Industry Policy and Defence Exports Promotion**

Under Roh, MND revamped the defence industry policy to enhance competitiveness of defence industry and to expand exports by fostering a defence industry that focuses on accumulation of technology. MND also took a step to subsidise the development costs of domestically developed projects. MND called compensation for localising technologies to be legalised. Roh administration believed that the key to improve the ability of national defence industries was to operate the defence policy based on the rule of competition among competitors in the defence industry. By enacting the Law on Defense Procurement on January 1, 2006, the act on special measures for defense industry which has played a pivotal role in supporting the defence industry last 30 years was abolished. The government's defence procurement policy that favors domestic R&D and localisation produced positive effects. The Fund for the Promotion of the Defence Industry prioritised the localisation of parts and components of the defence industry. However, Roh believed that healthy competition among the companies would be more productive and success.

In order to establish a truly self-reliant defence capability, the Roh government stepped up domestic defence industry infrastructure by enacting the "Defence Business Act of 2006,"



initiated by the presidential office. At present, between 65% and 70% of funds allocated to defence capability improvement still go to foreign procurement. The gap between the import and export of defence production has remained wide: second largest importer, fifteenth largest exporter. The Defence Business Act encourages active sales of domestic defence products to the outside market, but in 2007 ROK arms exports reached \$850 million for the first time, which is a remarkable achievement.

### **3.5.5 Contribution of DAPA for Defence R&D**

DAPA has also greatly contributed for the development of defence industry. Through the abolition of specialisation systematisation in defence acquisition program, monopoly and oligopoly system (legal delay by December, 2008), DAPA has revitalised the entry of new companies to the market and has prevented the existing defence companies sitting back. With foreign technology-oriented procurements for military force enhancement, domestic R&D was shrunk but its base has been strengthened with the expanded budget.

Based on the guidelines revision on component and part localisation on the stage of weapons system large quantity production, DAPA formed the environment to vitalise the fair and efficient component and part localisation through diversification of authentication standards and improvement of business processes. By extending the defence technology information integrated service (DTiMS) to the internet network, DAPA provides various technological information. DAPA increased the transparency of the electronic defense procurement system by the introduction of a biometric recognition system and the establishment of an institutional device which allows only one person per company to participate in the bidding.

DAPA has developed a project to secure Tactical Information & Communication Network (TICN) of high speed data communication available for voice-data-image information communication the current tactical communication system (SPIDER). Under this project certain weapons are identified to replace with better quality. There are projects for Falcon (KFX) Project to secure KF-16+ class fighters through R&D in order to replace aged fighters such KF-4 and KF-5, Korean Utility Helicopter (Surion) Project to secure Korean Utility Helicopters through

R&D in order to replace aged helicopters such as UH-1H and 500MD, Next-Generation Frigate, Project to secure the next-generation frigates through domestic building in order to replace aged corvettes and frigates and to defend the fleet sea area, Airborne Early Warning and Control System Project to secure Korean Utility Helicopters through R&D in order to replace aged helicopters such as UH-1H and 500MD, UAV for Division Reconnaissance Project to secure the UAVs through domestic R&D in order for the Army and the Marines to maintain the capability of surveillance and reconnaissance, Korea Air Force One Project to secure, through overseas purchase, a new type commanding aircraft available for long distance overseas flight (DAPA 2012).

In particular, DAPA has explored measures to support small and medium-sized enterprises (SMEs) because more participation from large enterprises is expected and plans for minimising infringement on a company's proprietary rights, which may take place due to M&A and overlapping investments. To this end, it will take various steps, such as increasing the compensation rate for cost savings from 50% to 90%. It will also strengthen Korea's institutional support system by selecting items suitable for development by SMEs or giving incentives to SMEs in accordance with their participation.

DAPA is making every effort for international cooperation and market expansion to export defense products. As a result of such an effort, ROK had exported \$2.4 billion worth weapons in 2011. Through the redefining of the roles of ADD, its scope has been reduced from all the weapon systems to strategic weapon and core technology. DAPA itemised the technology royalty reduction and exemption standards, and reasonably adjusted the technology royalty amounts. DAPA concluded an agreement with Korea Trade-Investment Promotion Agency (KOTRA) in order to vitalise the defence industry export, and targets the entry into G7 Defence Industry Export Club by year 2020 by securing cooperation foundation of the defense industry export. DAPA is doing its best for the advancement of defense industry based on thorough test & evaluation and scientific quality assurance method introduction. DAPA is doing its best for supporting the international defense cooperation activity on the governmental level based on quality assurance activity reinforcement.

### **3.6 Main Proposals for the Promotion of Defence Industry**

#### ***(a) Expanding Basis for Growth by Invigorating Defence R&D***

Realising the importance of upgrading the quality of defense science technology in order to equip defense industries with international competitiveness and contribute to development of the national economy, the MND plans to place more weight on defense R&D by elevating the scale to 7% of the defense budget by 2012. It will also encourage an open R&D structure such as joint efforts among industries, academia and the research sector, and a system that facilitates transfer of defence technologies to the private sector. By reinforcing international cooperation of defense science technology, it will broaden the foundation for the growth of defence industries.

#### ***(b) Improving Operational Control for Defence Industries***

The Ministry of National Defence is fostering policies to improve operating conditions for defence industries as it is a capital-intensive industry that necessitates a considerable size of infrastructure investment. First, it will reinforce financial aid to foster the industry. Second, it will offer a system that encourages self-initiated management innovation by rewarding efforts that rationalise management and costs at the contract signing stage. Third, it will seek to increase the proportion of domestic parts in weapons systems. Furthermore, the Ministry will develop policies to support development funds, in order to encourage domestic production of core parts.

#### ***(c) Establishing a Government-led Defence Industry Export Support System***

Unlike exports in the private sector, defence exports often necessitate government guarantees for stable supply of subsequent parts and technical support, as well as government-led marketing efforts. In particular, larger scale defence industry export requires government support efforts, as buyer nations increasingly request for demands such as industrial cooperation and local investment. The Ministry seeks to diversify its markets by establishing export strategies that differentiate among nations. By organising a “defence industry export task force” consisting of acquisition and export specialists, it plans to provide customised export support services. Moreover, by operating the Export Support Council for Defense Industries with participation by related agencies, the Ministry will coordinate immediate tasks that include reviewing buyer state’s desired terms and counter-purchase.

#### ***(d) Establishment of Defence Industry Development Council***

In order to boost the export of defence equipments and speed up the regulatory process, the government set up Defence Industry Development Council in early September 2011. It will serve as a control tower by propping up defence contractors, devising export strategies for equipment and technology, and orchestrating offset trades. It is also planning to enlarge the role of defence supplies trade support center under the Korea Trade-Investment Promotion Agency, as well as come up with support measures for defense firms, including tax cuts. The council is co-chaired by ROK Defence Minister Kim Kwan-jin and Economy Minister Choi Joong-kyung. Other members consist of government officials and experts from public and private thinks tanks, as well as trade agencies (Korea Herald Sept.5, 2011).

The Presidential Council for the Future and Vision reported national plans to develop the defence industry and create jobs in the industry for the purpose of defence advancement. The Council will perform overall reform on defence research and technological system that the Agency for Defense Development (ADD) monopolises. Except for major, strategic, and secret weapons, private firms will be responsible for the development of general weapons and their efficiency improvement. From 2011, general weapons development and their efficiency improvement are handled by some private firms and eventually all private firms will be slated to manage such a project by 2015. The ADD, instead, will focus on developing strategic and secret weapons.

### **3.6.1 Success of Defence Exports Under Roh Moo-hyun and Lee Myung-bak**

Though ROK started exporting arms products to third world countries since 1975, it was under Roh Moo-hyun that remarkable achievement was attained in this field. This success of this trend continues to grow during the early years of Roh Moo-hyun. The policies adopted by ROK government greatly contributed to the success of defence exports. Not only did the government allocate huge amount of budget for defence improvement, but also rendered financial support for the development of defence R&D.

Since 1980s, US restricted ROK third-country sales of arms which are produced under US license. In spite of that, ROK managed to export a certain volume of arms to various countries in

Asia, Africa and Latin America. Defence exports rose from \$147 million in 1998 to \$255 million in 2006, touching a billion mark in 2008. In cumulative terms from 1998 to 2006, exports of military aircrafts and related services have accounted for about 24% of total military exports, followed by naval vessels (23%), ammunition (21%), and off-set based exports (14 %). By 2007, Korea's defence industry was rapidly growing to match that of other economic powers.

Having secured the capacity to supply all of the conventional weapons needed for its own self-defence, Korea is aiming to become a global market leader in arms sales. The news that Korea has won contracts with Turkey sounded an upbeat note for the burgeoning defence industry. Turkey announced in June 2007 that it had signed a deal worth about \$ 450 million with Korea's aerospace giant, Korea Aerospace Industries (KAI), to acquire dozens of KT-1 basic trainer jets. This has been remarkable achievement for Korea as the deal not only includes arms supply but also import of technology. Korea, which has been traditionally a technology importing country has now climbed up the ladder to a higher degree.

The Revolutionary in Military Affairs (RMA)-driven defence industrial transformation is also changing the profile of Korea's exports of defence articles (Moon and Lee 2008). Korea used to export military uniforms, ammunition, and small arms in the past. However, RMA-related big ticket items have emerged as the mainstay of its exports in the post-2000s. For example, KAI exported KT-1 jets (Woongbi basic trainer aircraft) to Indonesia and Turkey, and will soon be concluding a supply contract of the T-50 (Golden Eagle trainer aircraft) with the United Arab Emirates. Samsung Techwin has also been successful in exporting K-9 self-propelled howitzers to Indonesia from 2000 to 2005. The Hyundai Heavy Machinery, STX, and Hanjin Heavy Industries have exported various naval vessels (FFK - Ulsan class Frigate Korea, LST - Landing Ship, Tank, and Flexible Support Ship) to Indonesia, Bangladesh, and Venezuela.

The Korean government revealed its blueprint of jumping to the seventh largest defence export country in the world with annual sales worth \$4 billion a year by 2020. In a defence and industry related ministries meeting, which was presided by President Lee on October 2010, the Presidential Council for Future and Vision reported national plans to develop the industry and create jobs in the defence field for the purpose of defence advancement. The Council laid out its

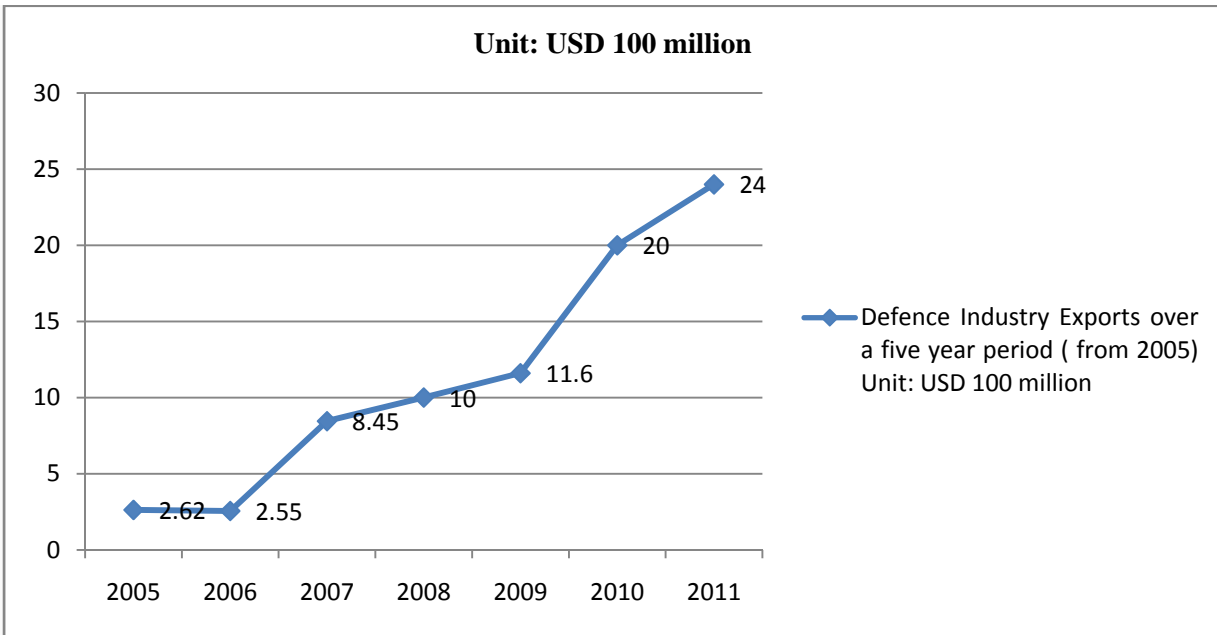
goal of joining the worldwide high ranks in defence industry exports and defence technology by 2020. It also aims to earn \$10 billion yearly to output and \$4 billion export sales as well as create 50,000 jobs by that year.

The increasing export figures may be attributed to the increasing number of foreign customers and growing array of internationally attractive defence product. Heavy exported to 46 countries in 2007, the figure grew to 59 in 2008, and 74 in 2009. In 2009, the US was the single largest export destination with \$390 million worth of exported product which included, among others, ammunitions, parts of aircraft engines and communications equipment, as well as wings for the A-10 Thunderbolt II. The highest growing export products for 2009 were \$224 worth of ammunitions to 18 countries, followed by \$85 million submarine combat management to Germany.

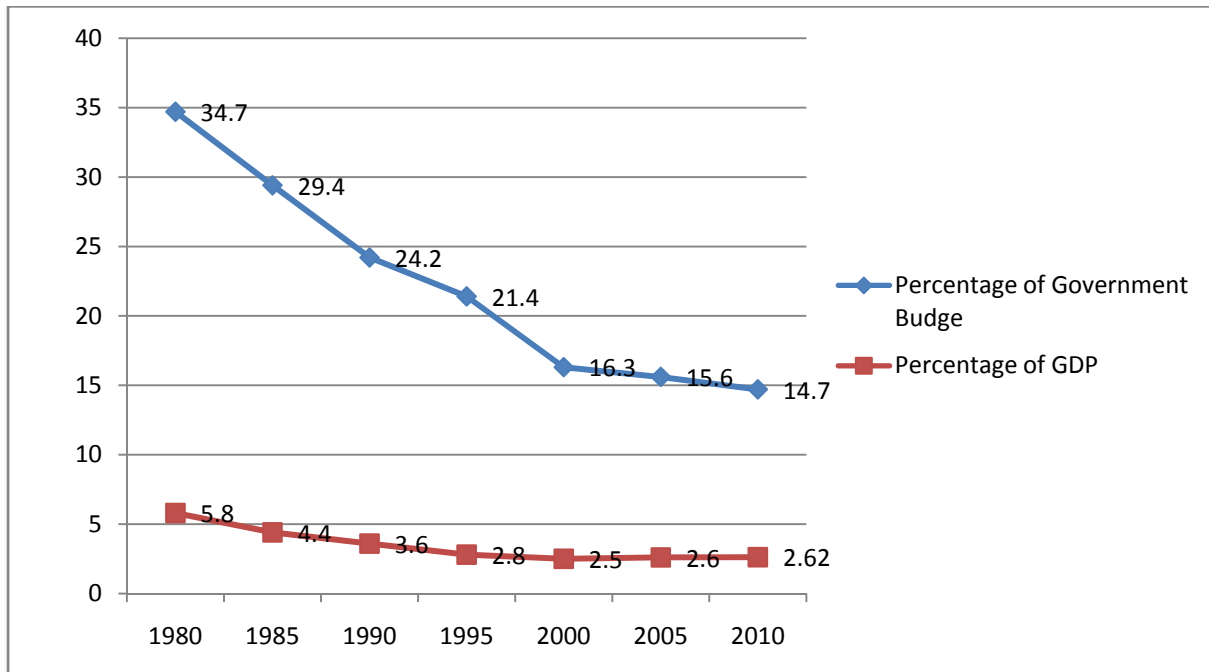
A discouraging indication may be evident in that ammunitions, a less sophisticated product type, continue to constitute a rather large proportion of exported defence products. Korea may expand and eventually solidify its footing in the international defence export market should its defence contractors exhibit greater ambition in exporting more sophisticated platforms and weapons systems. Providing potential to break this trend, or what has become more of a tradition, are the Korea Aerospace Industries (KAI) T-50 fifth generation trainer jet, the Samsung Techwin K-9 self propelled artillery, and various Naval ship export opportunities.

The T-50 and the K-9 have been reported as candidates for sale in 2010 to Singapore and Australia, respectively. However, the most likely deal to be signed in 2010 may be the export of single unit Patrol Killer eXperimental (PKX) guided missile fast attack craft. Known in the Republic of Korea Navy (ROKN) as the Yun Yeong-Ha class, Korean media reports indicate that export of the 450-ton ship to Kazakhstan may be prominent. A media report also indicated potential export to Azerbaijan.

**Graph 1. ROK Defence Exports (2005-2011)**



**Graph 2. Proportion of Defence Budget to GDP and Government Budget (1980-2010)**



**Source: ROK Defence White Paper 2008, 2010**

As of 2012, 16 TA-50 light attack variants of the family has been ordered by Indonesia. Additional export orders are being pursued in countries such as Iraq, Poland, Philippines and Spain. T-50 is also being marketed as a candidate for the T-X program of the United States as the United States Air Force's next-generation advanced trainer. The T-50 is the proposed base for the F-50 next-generation indigenous fighter.

### **3.6.2 Reasons for the Success of ROK Defence Exports**

The success of Korean arms exports has been remarkable and is the pride of ROK leadership. Various factors were responsible for the success of Korean arms exports in the course of three decades. It was the joint efforts of the government and private firms that they attained this grand success. The first is price competitiveness, which has been natural outcome of low labour and overhead costs. The high standard of Korean weapons productions is also one of the major causes of attraction for the potential buyers. Unlike most of the Third World countries, ROK weapons systems are mainly based US standards. This standardisation makes Korean weapons more attractive.

Another reason for the success of Korean arms export is due to its non-political attachment. Unlike other dominant suppliers, ROK does not attach any political strings to arms deals. Western suppliers, particularly US, UK and to some extent French suppliers are subject to various internal and external pressures, as these countries are the major players in the international politics. Although external restriction on third-country sale by the US applies and is detrimental, no internal political pressures impede arms exports. As a result of this, ROK can pursue aggressive export drive. Apart from the supply side, demand has also been favourably to the increase of Korea's arms exports. South Korean-made weapons were in demand by countries infected with regional and internal instability in Asia, Africa and Latin America. In recent years some peaceful countries too purchased Korean-made weapons for military modernisation.

Moreover, the effective export promotion strategy implemented in concert between the Korean government and the private sector has allowed the country to expand its international market. Having realised the limits of export promotion through government-to-government channels, the



ROK government began to engage the private sector as an alternative marketing channel, utilising the global marketing networks of General Trading Companies. In a similar way, the Korea Defence Industry Association (KDIA) and the Ministry of Commerce and Industry have assumed more active roles in promoting arms exports. In general, the shifts of the government's policy from control and coordination to support and felicitation have contributed to promoting military exports.

**Table 11. Major ROK Defence Exports Items and Recipients (2003-2009)**

<b>Year</b>	<b>Amount (\$ million)</b>	<b>Main items</b>	<b>Major countries</b>
2003	262	SPG parts, submarine overhaul, F-15K parts, parts of armoured vehicles munitions	27 nations including Indonesia, US, Turkey, Malaysia, Venezuela
2004	420	Landing ship, SPG parts, F-15 K parts, aircraft, parts for armoured vehicle, munitions	31 nations including Indonesia, US, Turkey, Malaysia and Venezuela
2005	260	F-15 parts, SPG parts, KT-1 trainer, 25 ton military standard vehicles	34 nations including Indonesia, US, Turkey, Thailand
2006	260	F-15 K parts, SPG parts, aircraft mgt parts for armoured vehicle, munitions, unmanned surveillance robots	44 nations including Turkey, Indonesia, UAE, Malaysia, Australia, Israel
2007	850	KT-1, K-3 rifle & munitions, 5/4 ton military standard vehicles, manufacturing services for the main wing of A-10 aircraft	46 nations including Turkey, Philippines, US Pakistan
2008	1000	Next-Generation Tank (XK-2), Production Technology, 155mm Ammunition Parts, K-9 Self-Propelled Artillery Spare Parts	59 countries, including Turkey, US and Egypt
2009	1116	Ammunitions, Communication Equipments, Depot Maintenance on Submarines, Submarines Combat System	74 countries, including US, Iraq and Germany

**Source: ROK Defence White Paper 2008, 2010**

ROK's success in defence exports has been due to government initiatives in supporting defence industries as well as its exposure to international customers through exhibitions. The 2009 Seoul International Aerospace and Defense Exhibition (ADEX) held in October was attended by 273 businesses from 27 countries earning \$ 360 million. The MND has also beefed up its efforts to

penetrate overseas defense markets. In 2010, it held the Defense Industry & Military Logistics Joint Committee with 12 countries participating. Furthermore, it took part in six exhibitions held abroad, including Langkawi International Maritime and Aerospace Exhibition (LIMA). In the future, the MND will strive to realize the national goal of 'developing the defense industry into a new economic growth engine' capable of playing an active part in developing the national economy. As for future defense industry exports, the MND will seek to achieve its target rank in the world's export market of the tenth position in 2012 and the eight in 2015 and seventh in 2020.

The success of ROK defence export under Roh Moo-hyun and Lee Myung-bak has been a great remarkable in the history of ROK defence industry. This shows that ROK has attained certain level of success in its indeginisation of defence production. However, the amount of import has also been relatively high compare to its export. With \$7 billion worth arms imports in 2011, ROK is rank second, next only to India (\$10 billion). The ROK still lacks in developing and producing highly sophisticated weapons. The future success of arms exports will greatly depend on ROK's progress in R&D sector to develop its own advanced technology. The success of ROK defence export will greatly depend on its success of political diplomacy with other countries as well as the quality of the products and price competitiveness.

## CHAPTER 4

# ROK's Defence Industry: Constraints and Policy Lessons

### 4.1 Introduction

After four decades of indigenisation of defence production, ROK is self-sufficient in small and medium weapons. However, the country is still lagging behind in developing sophisticated weapons that need high technology and specialisation. The defence Research and Development has been suffering from poor maintenance and low level of budget allocation. As a result, ROK has become one of the largest arms importers of the world. Indigenisation of defence production has become costly and has required high level of technology.

This chapter will look at different problems faced by ROK defence industry in the past for decades. The main weaknesses of ROK defence industry are: US restrictions on arms sales produced using the latter's license and coproduction, low level of Research and Development, lack of interest on the part of companies for defence production and lack of interest of military personnel on defence R&D. Although defence production has been started with an aim for attaining "self-reliant" national defence, in the course of time as defence production has grown larger; exporting defence products has been adopted by Korean government for sustaining the defence industry. This is not an easy move for ROK as most of the weapons are produced under United States license or co-production rights.

There have been various instances of US restrictions of ROK arms sales to developing countries since the country started exporting arms in 1975. The US government passed Arms Export Control Act (AECA) and International Traffic in Arms Regulations (ITAR) 1976, in order to check arms sales to third countries, produced using its technology. These twin acts became a hindrance for ROK free export of arms to other countries in general and those countries which are having unfavourable relations with America in particular. The recent success of ROK arms sales including fighter has alarmed US and thus the latter became cautious about technology transfer to ROK. In some cases, ROK was accused of selling arms, produced under US license.

## **4. 2 US Restrictions on the Export of its Technology**

US greatly contributed for the production of weapons since the early 1970s. Though Nixon Doctrine announced for non-military involvement in Asia, it on the other hand paved the way for indigenous defence industry in South Korea by providing financial and technological help it needed (Nolan, 1986: 28). As discussed earlier, ROK heavily depended on US for weapons technology. A total of 881 free technical data packages (TDP) were transferred to ROK, mainly from the US, to support security in the early 1970s. About 14% of them (124 cases) were used by the Korean defense industry to establish a domestic production base for conventional weaponry. This technological dependence on the US in the course of time limited the autonomy and maneuverability of military exports. From 1980 on, however, the US suspended the supply of free TDPs, in defence of the intellectual property rights of the US manufacturers. The deal included Northrop's technological assistance.

The ROK and US Governments have been at odds since the early 1980s over South Korea's desire to export weapons and military equipments produced under US licenses. US law requires State Department approval before South Korea exports military equipments manufactured under US licenses or coproduction arrangements. Washington requires three criteria to Korea's request to sell arms to other countries: 1) the political views and policies of the recipient nation; 2) the production status of the US defence industry; and 3) the possibility of economic loss to US defence firms (Hwang 1985: 5). The US Army Security Assistance Center, which must approve these sales, usually assumes that Korean sales mean reduced production opportunities for US defence industries. It thus disapproved most sales of weapons by ROK.

Since the initial stage, ROK arms production collaboration with the US has two elements. The first is to develop a significant role for Korean firms as a supplier of components and parts to major defence that produce in United States, South Korean leaders stress the advantages of Korean firms supplying components and parts at reduced costs, as major US defence corporations face declining US defence budgets, fewer contracts and a greater need for efficiency and cost-cutting. Apart from this, exports are the second elements of the partnership strategy. ROK's desire to export arms made under US licenses to third countries has been one of the

conflicting points between the two countries. Korea's pro-export policy is in contrast to Japan's ban on arms export, which potentially could create a new source of competition to US-produced weapons in the world markets. Therefore, US Government often vetoed proposed ROK arms sales overseas. This is not surprising in view of ROK's export potential since the late 1970s.

In order to check arms transfers manufactured under US licenses to third countries, the US Government enacted Arms Export Control Act (AECA henceforth) in 1976, which gives the President of the US the authority to control the import and export of defence articles and defence services. In the same year, the International Traffic in Arms Regulations (ITAR henceforth), that control the export and import of defence-related articles and services on the United States Munitions List (USML). Both these acts strictly limit the third-country sale of defence articles produced with US assistance, technical data, manufacturing licenses, and coproduction by countries receiving these services. Essentially, the restrictions are meant to keep weapons out of the wrong hands, but can have a detrimental effect eventually. While AECA broadly defines the policy guidelines without mentioning specific details, the ITAR stipulates several provisions concerning 3CS (Third Countries Sales) (Baek et al. 1989: 169).

Section 124.9 of the ITAR states that:

The technical data or defense service exported from United States in furtherance of this agreement and any defense articles which may be produced or manufactured from such technical data or defense service may not be transferred to a person in a third country except as specially authorized in this agreement unless the prior written approval of the Department of State has been obtained. (ITAR Section 124.9 (e))

This section to a great extent blocks ROK's arms sales to third countries since most exportable defence articles are made under technical assistance agreements with the US. This has been a great hurdle for ROK's arms export arms to other countries. Not only this, there are other restrictions on ROK arms export under these regulations. Section 124.10 of the ITAR further imposes similar restrictions on foreign licenses by making obligatory the incorporation of the following statement in a contract:

These commodities are authorized for export by the US Government only to (country of ultimate destination or approved sales territory). They may not be resold, diverted, transferred, transhipped, or otherwise be disposed in their original form or after being incorporated through an intermediate process into other end-items, without the prior written approval of the Department of State.

Section 124.11 of the ITAR further made a requirement for the foreign party that a manufacturing license agreement or technical assistance agreement should sign a non-transfer and use of assurance certificate, this being a condition for the approval of any such agreement relating to significant military equipment, classified articles, or classified data.

The AECA and ITAR do not totally block ROK or other recipient countries third country sales of arms but demand for certain requirements for such activities. By inserting the provision of “prior written approval” of the State Department, they leave room for negotiation. This means that US approval of arms sales to third country is an administration decision made by the involvement of federal agencies. And third country sales is usually subject to case-by-case approval as stipulated in commercial contracts or bilateral technical assistant agreement dictated by the ITAR. Thus, the Korean party files petition on case-by-case basis through Ministry of National Defense (MND) which passes to US Department of Defense with the approval of Joint US Military Assistance Group in Korea (JUSMAG-K)

The US should approve or disapprove the petition of ROK for third country sales depends on the individual character of the recipient country and the type of items involved. There are three important basic guidelines relating to US foreign and military policy criteria. These criteria are: 1) the needs and wants of the final recipient countries; 2) impacts on arms control and regional military balance; 3) congruity with broadly defined US national interest, such as counter-Soviet influence; 4) impact on US political and military leverage over the final recipient country; and 5) impacts on the diffusion of international terrorism. The second important guideline is related to the issue of human rights violation. As in the case of arms exports, the US does not allowed third country sales to those countries which violate human rights. The final guideline is the boomerang effect on the US domestic defence industry which might result from third country sales of the US-originated defence articles or services. This means that, if third country sales by ROK is perceived to bring about negative impact on the defence industry or to transfer advanced, sensitive US defence technologies embodied in 3CS items, the petition is usually disapproved.

On the basis of these three primary guidelines, the US specifies the destinations and items approved or disapproved for third country sales by Korea. These guidelines have become hurdles for Korea to export arms to other countries, as most of the weapons are manufactured using US

technology. While foreign policy and human rights guidelines determine the destination of 3CS, boomerang effects on the domestic defence industry shape the nature of 3CS items. The US has been curtailing Korea from selling defence products to countries that are short-listed by the former as human rights violations. Korea cannot pursue 3CS to Iraq and Iran not only because they are not in foreign policy congruity with the US, but also because they are parties in conflict, which US prohibited on ground of exports to unstable region. Arms sale to Libya is not permitted as the country is believed by US to grant sanctuary to international terrorists. Sale of lethal weapons to Chile, Nepal and Bangladesh is prohibited because of human rights violations in these countries. In the same manner, a Korean requests for 3CS to Columbia was rejected on the grounds of human rights violations.

There was a controversy in March 1982 over the proposed sale of howitzers, mortars and other munitions to Jordan by the major Korean ammunition manufacturer Poongsan Metals (Nolan 1986: 68). The US denied the sale on the grounds that the equipment was partially American in origin and the weapons were in reality intended for Iraq. The argument by Poongsan representatives was that another supplier would just provide Jordan (or Iraq) in Korea's place. In contrary, the justification by US was that Korea had already refused other potential customer like Iran and lost its effort to be 'pro-American'. Third country sales to 13 countries like Benin, Liberia, Ghana, Madagascar, Sri-Lanka, Haiti and Paraguay requires consultations with the US prior to any export activities.

In addition to foreign policy constraints, domestic considerations of the US defence industry restrict 3CS in four ways: quantitative limitations (quota), total ban, consultation prior to export activities and approval of items in lieu of the industry-by-industry agreements for those property rights are owned by US companies, not by the governments. Out of those items which require prior written permission, some specific items are categorized as totally banned items regardless of the destination. There is another serious obstacle to 3CS: the US provision that requires a non-transfer and use certificate, issued by the Foreign Minister of the final recipient country. One of the attractive features of Korean hardware for many Third World countries is the perception that Korea would not attach any political strings to the final use imported military hardware. However, the US requirement for a non-transfer certificate issued by the Foreign Minister of the

recipient country, which is considered by many peddling of political influence, is dealing a severe blow to Korea's military exports.

US regulations on 3CS have serious impact on ROK's import of defence items, as the latter greatly depend on US for its arms supply. During the period 1981-82, ROK requested a total of \$55.4 million for 3CS approval, of which only \$1.7 million (3%) was approved. It was a bit better in 1983, when US approved \$4 million (8%) out \$49 million requested for 3CS. However, there was a sharp downturn in 1984; although Korea requested a total of \$31 million for approval, the US government allowed only \$870,000 (2.8%). On top of this low approval rate, the heavy taxing on Korean military exports by the US has further diminished the ROK's competitive edge. The US government imposed an 8% royalty on those export items of US origin, which is relatively high compared to the customary international rate of around 3%. Furthermore, the method of the US calculation – originally an 8% royalty on the basis of US FMS price – has created additional difficulty for Korean exporters<sup>17</sup>.

Under Section 126.1 of ITAR, United States continues to retain prohibition of arms exports and sales to certain countries, which are violating human rights and aligning with terrorist organisations. It is the policy of US to deny licenses and other approvals for exports and imports of defence articles and defence services, destined for or originating in certain countries. These countries include Belarus, Cuba, Eritrea, Iran, North Korea, Syria and Venezuela. This also applies to those countries which US maintains arms embargo; Burma, China, Liberia and Sudan (Section 126.1(a) of ITAR). Arms exports and imports to and from countries which are mandate by United Nations Security Council (UNSC) embargoes – Cote d'Ivoire, Congo, Iraq, Iran, Lebanon, Liberia, North Korea, Sierra Leone, Somalia and Sudan - are also prohibited by US for the same. US further prohibit exports and import of defence articles and licenses to and originating from Afghanistan, Haiti, Libya and Vietnam with few exceptions on non-lethal weapons (For details see Section 126.1 (c) of ITAR).

---

<sup>17</sup> Data collected from ROK Ministry of National Defense sources



US arms sale regulations to third country have greatly hampered ROK to export defence articles to other countries. There have been instances in which ROK was restricted to export arms to countries which are hostile to US. This source of aggravation for the ROK is in the area of third country sales of defence items of US origin still prevails in the post-Cold War when ROK diversified its technological cooperation. In 1995, the US granted ROK the permission to export K-1 tanks that it makes using US technology. In the same year, the US assured ROK that the latter would be the nation to supply light water nuclear reactors to North Korea. Despite this, third country sales have been continued source of irritation for the ROK. As a result of frustrations in areas such as third country sales and technology transfer, the ROK has been seeking other alternatives to the traditional US-ROK weapons sales arrangement.

In 2006, there was an incident in which US asked ROK to restrict arms sales to Venezuela, which US listed as a country unwilling to cooperate in its fight for terror. Sympathising US government's strong concern, ROK took it serious and conveyed that, "given the ROK's small volume of arms exports to Venezuela, the ROK government decided that imposing a complete embargo could lead to unnecessary misunderstanding between the ROK and other Latin American countries". Therefore, the ROK government asked US government to allow one ongoing contract for transfer of munition components to conclude. ROK Ministry of Foreign Affairs and Trade, South America Division Director Park Dong-won said the ROK government would scrutinize closely all future arms related exports to Venezuela, following relevant ROK export policy and regulations, and stop as necessary those that might cause destabilizing effect. US not only restrict ROK from transferring arms products to hostile countries, but also to friendly countries like Singapore, when it comes to arms manufactured under US license. In September 2000, the US reportedly had imposed a selective ban on the export of its weapons to ROK, in part because of an arms dealer's complaint that Korea was exporting K440 Claymore mines to Singapore that were based on US technology (*Korea Times* Sept.21,2000).

While, US technology control in itself appears to be the primary reason in this case, it was not too long ago that the US also suspended exports of crucial missile parts to Korea, as a leverage in its future missile talks with Seoul, causing serious delays in the production of missiles and torpedoes and hampering Korea's defence preparedness. The news report about this incident

goes on to a quote of former US government official as saying that, “The issues is that, the US government in order to gain upper hand in this talks and to emphasise how they control things, is delaying its approval on certain technologies until they get their ways at the talks (*Korea Times* Jan.12, 2000). Both the incidents help to underscore the fact that as long as Korea remains heavily dependent on US weapons and military technology, it also remains vulnerable to such manipulation. This may hinder ROK’s ambitious plan of self-reliant defense policy in the future. However, US iron hand on ROK, though looks humiliating for the latter, it may contribute for ROK to reach out to other potential countries in Europe for alternative sources of military hardware and technology.

### **4.3 Low Level of Research and Development**

One of the criteria for measuring the country’s level of development is its’ level of research and development (R&D). ROK, like major Asian arms-producing states like China, India and Japan, is unique in its persistence in following a decidedly ‘techno-nationalist’<sup>18</sup> demanding self-sufficiency in armaments production (Bitzinger 2011: 427). This is mainly due to the past experience and future fear of trade embargoes and restrictions by the arms supplier countries. The Agency for Defence Development has been funded by the government since its establishment in 1971 for the advancement of indigenous weapon products. This agency carried out various research projects and pursued advanced indigenous designed weapons in order to mitigate its technological dependence on US. However, even after 40 years of significant public and private inputs in infrastructure in technology, ROK still possesses only limited capacities for its arms production needs. Most of its highly sophisticated technologies are imported from US and other advanced countries with a huge cost of capital. While the country’s defence technology and industrial base has elevated from a third-tier arms producer to a second-tier one by virtue of considerable effort and investment, much of the local defence sector remains deficient when it comes to innovation and indigenization (Moon and Paek 2010: 1).

---

<sup>18</sup> Techno-nationalism refers to the course of moving from imitating technology to innovating and advancing technology- in this case, for the creation and promotion of a national defence industry. Richard Samuel argues that techno-nationalism is the ‘struggle for independence and autonomy’ through the indigenisation of technology. Peet and Tyroller-Cooper define the techno-nationalist model as ‘characterised by a focus on the development of indigenous capabilities for self-reliance and autonomy (Bitzinger 2011).

The overall level R&D of ROK including defence industry is still low compared to other advanced countries. According to the data provided by the Ministry of Education Science and Technology (MEST) and S&T Evaluation and Planning (KISTEP), ROK's level of core science and technology (based on 90 areas in 2008) is 72.8%. This is in comparison to the world's top level put at 100%. ROK is said to be 6.8 years behind the technological level of the world's most advanced countries. That area in which the ROK recorded its highest score was information/electronics/communication (81%), followed by nano/materials (77.3%), machinery/manufacturing (73.6%), space/aviation/marine technology (70.8%) and energy/resources. The scores for other areas are: intelligent robots (70.7%), next-generation weapons developments technology (64.8%), satellite navigation systems (61.5%), next-generation aircraft development technology (60.1%), satellite body (main body/payload), development technology (59.6%), and planet exploration/space watch systems development technology (56.7%) (Paek 2010: 202).

ROK greatly depends on other countries for core technology<sup>19</sup>, which in turn becomes a big hurdle for its indigenisation programmes. Local arms production, therefore, continues to rely greatly on foreign inputs in several key areas. In some cases, the leading arms producing countries refuse to transfer the key technologies due to the fear for the potential market competition. ROK defence industry is only truly self-sufficient in small arms, ammunitions and armored vehicles; in most other cases, a considerable proportion – at least 40% - of the value indigenous production is foreign in origin (Cheng and Worth 1996: 250). Several critical components in indigenised defence products like K-1 main battle tank – engine, transmission, gun and sight – are actually produced in the United States and Western Europe. Likewise, some components in Chunma short-range air-defence system utilises a French-supplied missile, radar and fire-control system comprising 43% of foreign systems by value, while the KIFV infantry fighting vehicle is essentially a reversed-engineered copy of a US-designed armored vehicle. The KDX-III incorporates US Aegis air-defence radar and Standard surface-to-air missile and comprises of 54% of localised production. The KT-1 Trainer plane has localization rate of 44%,

---

<sup>19</sup> Core technology projects are those for development of technologies that other countries refuse to transfer and that must be secured.

while the localization rate for the country's pride T-50 advanced trainer jet, which is jointly developed by KAI and Lockheed Martin is only 61%. Many indigenous production systems, including T-50 advanced jet trainer still rely heavily on foreign design and system integration.

**Table 12: Level of Defence Science and Technology of Major Countries**

Main areas	Sub-areas	The most advanced countries (0.9+)	Leading countries (0.80-0.89)	Mid-level countries (0.70-0.89)	Countries falling behind the major countries
Command/control/communication	Command/control	USA	Israel, Japan, Russia	China, ROK (0.74)	-
	Tactical communications	USA	Israel, Japan, ROK (0.81)	China	-
Surveillance/reconnaissance	Sensor	USA, Russia	Israel, Japan	China, ROK (0.73)	-
	Electronic warfare	USA, Russia	Israel	Japan, ROK (0.78), China	-
Maneuverability	Maneuver system	USA, Russia, Israel	Japan, ROK (0.89), China	-	-
	Future combat system	USA	Japan	Russia, China, ROK (0.71)	-
Firepower	Firepower	USA, Russia	ROK (0.88), Israel, Japan, China	-	-
	Ammunition	USA, Russia	Israel, China, Japan	ROK (0.79)	-
Naval ships	Naval ships systems	USA, Russia	Japan, China	ROK (0.79), Israel	-
Aircraft	Aircraft systems	USA, Russia	Japan, China, Israel	ROK (0.72)	-
Satellite (Space)	Satellite systems	USA, Russia	Japan, China, Israel	-	ROK (0.67)
Guided/air defence weapons	Guided/air defence weapons	USA, Russia	Japan, Israel, China	ROK (0.79)	-

**Notes:**

(1) Figures for ROK, China and Japan are reformulated. Israel is stated for comparison.

(2) Countries with 0.90 or over are classified as "the most advanced." Those with 0.80 or over, but lower than 0.90: "advanced." Those with 0.70 or over, but lower than 0.80: "mid-level." Median: 0.75. The level of the United States is put at 1.

(3) The area of countries as stated in the table is in the order of their level.

**Source: Paek 2010**

ROK's overall science and technology level appears to be in step with its defence-related science and technology level. According to the ADD, in 2006, the country's defence related science and technology stood at 68% against the 100% for countries like United States, United Kingdom and France (Paek 2010: 202). It added that the ROK's maneuverability and firepower sectors were approaching the technological level of major countries, but it had a long way to go in aviation, surveillance/reconnaissance and new special weapons. In the year 2006, the mean R&D expenditure of ROK government on defence was 4.5% of GDP, while it was 13, 12 and 11% in the US, UK and Russia (Jeong and Heshmati 2009: 223). The ROK's defence-related science and technology level for sophisticated weapons remains below 50% of that of major countries, while its aviation and surveillance/reconnaissance/new special weapons remains at the 48% and 40% level, respectively, of major countries (Paek 2010: 202).

Although ROK has achieved great success in the field of science and technology, the level of ROK defence science and technology compares favourably with that of the neighbouring countries, China and Japan, only in areas of maneuverability, firepower and tactical communications. In maneuverability and firepower, the ROK has reached a level close to that of world's most advanced countries. In tactical communications, the ROK keeps abreast the level of major countries. In naval ships, guided/air defence weapons, ammunitions, electronic warfare, the ROK is only a little behind the major countries. Regarding certain guided missiles, the ROK has reached a level close to that of the major countries. In command/control, surveillance/reconnaissance and sensor/aviation, the ROK is a little behind the major countries but has a long way to go in core technologies. There is definite gap between the ROK and the advanced countries in technologies concerning fighter planes, helicopters, next-generation guided weapons and mid-sized submarines. In technologies concerning radar/synthetic aperture radar (SAR), sonar detection and electro-optics in surveillance/reconnaissance, as well as areas of satellite/space, the ROK remains much behind the major countries. In regards to fighter planes, airborne refueling planes, next-generation guided weapons or next-generation military satellite system launch vehicles, it has been determined that the ROK's technology is about a generation behind those of major countries.

According to the findings of Kyong-Ihn Jeong and A. Heshmati (2009), the limitations in R&D of the Korean defence industry can be summarised as follows:

- 1) the technological foundation for the defence industry has been weakened because of the ADD's central role in defence R&D and the defence firms have only been in charge of production the amount of domestic defence production has decreased due to the defence acquisition policy that was mainly dependent on foreign acquisition;
- 2) the defence firms are not interested in innovation and new product development, but concentrate their attention on profit margin and output;
- 3) there is a low demand for R&D that can be assigned to domestic defence firms, and a shortage of government effort in searching for new R&D
- 4) for a quick achievement of increased defence capability, the government does not have enough time to consider newly developed indigenous technologies or products, rather, it puts its priority on acquiring, introducing, and adapting technologies from abroad.

These above mentioned reasons caused a vicious cycle of weak foundation of defence firms for technology development.

The development of advanced weapon systems and capabilities for essential technologies by ROK remains at a relatively low level due to the following reasons:

- 1) reliance on foreign nations for advanced weapons systems;
- 2) research heavily focused on system development as opposed producing technologies; and
- 3) bifurcated structure of the Agency for Defence Development (ADD) managing research and development (R&D) on the other hand, and the defence industry taking on assembly and production on the other (Paek 2010: 197).

The problem in technology development is that there is no incentive for defence firms to invest in R&D. The firms bear all the expenses of activities for technology development and take full responsibility for failed R&D. The government does not compensate firms for their loss brought for failed R&D activities. Further, the government provides very limited economic compensation system and does not guarantee procurement after a successful development. There is no

difference in firms' profit level between using parts developed by Korean firms applying parts imported from abroad or made by subcontracting firms.

#### **4.4 Defections of Indigenous Defence Products**

Though ROK has achieved great in indigenising various weapons productions, there are defects in some of the indigenous weapon products. This is a big concern for the policy makers and analysts, as there have been reports of the malfunctioning of Korean-made weapons in recent years. A growing number of politicians and defense experts are expressing exasperation over the country's repeated failures to produce world-class weapons. They claim that the nation may face a serious defense loophole due to the government's zeal to replace high-tech military imports with indigenous ones and make its arms industry a new growth driver. Minister of National Defense Kim Kwan-jin earlier said the domestic production of military equipment, including the K9 howitzers, needs to be re-evaluated. He said there was a need to localize weapons production, but problems arose when the weapons were put into the field prematurely.

The North Korean artillery attack on Yeonpyeong Island on November 23, 2010, killing 4 persons (2 civilians) and injuring 19 (including 3 civilians) has put the spotlight on South Korea's defense industry after several of the K9 self-propelled 155-millimeter howitzers stationed on the island failed to function in response. Of the six Korea-made howitzers deployed on the border island in the West Sea, two could not function properly due to the North's artillery fire, and one could not immediately respond because a dud shell blocked it. The remaining three K9 155mm-howitzers fired 80 shells against North Korean artillery units, but most of them missed their targets. Redefining defense priorities, Representative Yoo Seong-min of the GNP claims that the government should make the first priority beefing up national security, rather than boosting the export competitiveness of domestically made arms.

At a National Assembly hearing to examine the attack, the K9 units were found to have problems with its engine being damaged by an anti-freeze liquid. Representative Kim Hak-song of the ruling Grand National Party (now Saenuri Party or The New Frontier party) claimed that the high defect rates among Korean-made weapons stem from the military's excessive demands on

required operational capability (ROC). “Korea should acknowledge its own limits in its capability to develop advanced weapons,” he said in a recent parliamentary hearing. “It should consider lowering ROCs.” In addition, 1181 K-11 assault rifles, which went into production this year by S&T Daewoo, are being investigated for technical flaws. There are reports that the next-generation PKX-A high-speed patrol boat has steering problems, while the K-21 infantry fighting vehicle, built by Doosan DST, has had flooding problems during military exercises.

The development of K2 tanks, K9 self-propelled howitzers, K11 dual-caliber rifles, K21 infantry fighting vehicles and guided-missile patrol boats has encountered major setbacks, according to officials of the Defense Acquisition Program Administration (DAPA). It has been even debated in the ROK National Assembly as there has been dissatisfaction over the performance of the locally-designed weapons. ROK’s weapons exports lingered at \$1.2 billion in 2010, up about 2% from 2009, partly due to the disappointing performance of the K9 self-propelled howitzers when North Korea undertook a surprise artillery attack on Yeonpyeong Island. The budget for research and development of weapons is only 5 to 6% of total defence spending. In spite of that, some analysts are worried that ROK is in a situation where even the accumulation of such technologies is not properly managed.

A 2011 DAPA report shows that Korea’s arms technology still lags behind that of advanced countries but the military is demanding local manufacturers produce weapons that exceed performances of any of the existing ones. It says Korea’s core military technology is roughly 78% of the level of the United States and Britain. Representative Sim Dae-pyung, chairman of the minor opposition People First Party, claims that Korea must succeed in making reliable arms products before contemplating selling them overseas. “So many flaws have been found in the K-series weapons,” Kwon Oh-bong, vice commissioner of DAPA, admits that the arms procurement agency is struggling to meet the two lofty goals of better countering Pyongyang’s increasing threats and boosting the economy through the promotion of local arms manufacturers.

In an attempt to draw the international attention and to consolidate military rule, North Korea attacked the ROK Navy corvette *Cheonan* and sank it in the Yellow Sea just south of the disputed Northern Limit Line near Baengnyeong Island after an explosion in the ship’s stern



ripped it in two on March 26, 2010. Of the 104 South Korean sailors on board, 58 were rescued; 46 are dead or remain missing. The deadly attacks of Yeonpyeong and Cheonan, which killed 50 South Koreans, are widely seen as wake up calls in realizing the importance of strengthening military readiness against imminent enemy threats. ROK Defence Minister Kim Kwan-jin has also vowed to bolster the country's military capability to strike back against the North as a part of the comprehensive military reform, called the "307 Plan," that he announced on March 8, 2011. There is a big challenge for ROK to arm themselves with the latest sophisticated weapons to be able to defend effectively from the possible North Korean attack.

Despite mounting criticism experts say the government cannot let go of its ambitions to make the country an arms development powerhouse. In fact, DAPA announced in mid-March 2010 that it would postpone the deployment of the K2, the country's new main battle tank under development, by up to one year to 2013 because of mechanical problems involving its engine and transmission. Earlier, the defense minister reportedly decided to import a key part of the K2 tanks from Germany to meet the scheduled date of deployment. Korea initially planned to start mass production of the K2 in 2010, but the plan hit a snag in 2009 after the engine and transmission, known as the "power pack" was found to be defective. DAPA's announcement should be a relief for local defense contractors who will have more time to fix the problems. Critics, however, say the decision may pose a security risk and is an embarrassment for the military, which wants to replace aging K1 and U.S.-built M48 tanks with the K2s.

According to the report by Asia Security Watch on April 3, 2012, ROK continues to suffer growing pains in becoming a bona fide producer of advanced military equipment, as the country's military industrial complex hits a snag in the construction of the country's first batch of K-2 battle tanks. The tanks, which are the most expensive ever manufactured by ROK, are currently seeing problems with their indigenous power train systems, specifically their engines and gearboxes. As ROK rushes to bring the K-2 into service, the country will turn to Germany for help in bringing the first 100 Republic of Korea battle tanks online. The Defense Ministry has now decided to import the power pack for the homegrown K-2 battle tank since the problems with the Korean-made engine and gearbox are unlikely to be solved any time soon. The decision

to buy German-made power packs for the initial batch of 100 tanks was approved at a meeting chaired by Defence Minister Kim Kwan-jin, the Defense Acquisition Program Administration.

In 2010, the Army admitted to a maintenance failure of K9 howitzers, saying cheap antifreeze resulted in damaging the diesel engines of the costly machines. Army officials said 38 engines of about 500 K9s encountered a phenomenon of cavitation that caused damage to engine components and a loss of efficiency. Locally developed by the state-run Agency for Defense Development in 1998, the K9 howitzer has a maximum range of 60 kilometers and can fire up to eight rounds per minute. In the past two years two K21 amphibious infantry fighting vehicle sank, killing one soldier.

A team of military and civilian experts came to the conclusion in late 2010, after a two-month investigation, that a lack of buoyancy, malfunctioning of the wave-plate and drain pump problems was main factor in the sinking. They also found that when the vehicle moves at full speed, the pressure inside the engine compartment goes down, allowing more water to flow inside. The pump also failed to adequately remove the water. Defects have also been found in eight of the 22 K11 airburst assault rifles that Korean troops dispatched to Afghanistan and United Arab Emirates use. According to a senior official of the arms procurement agency, DAPA plans to resume deploying the new airburst assault rifle in November after fixing technical problems with its fire control system and laser range-finder. Korea spent 18.7 billion won (\$16.7 million) to develop the K11 under a project launched in 2000.

With many analysts expecting a further rise in tensions with the North, attention is being paid to operating standards of South Korea's homemade weaponry and whether the country is justified in having created an extensive arms industry. *"South Korea may be a perfect example of 'technology overreach' in its indigenous arms industry as earlier success with local arms production has bred greater ambitions, which in turn might spur it to pursue programs that lay beyond its economic or technological capabilities,"* said Richard Bitzinger, a senior fellow at the S. Rajaratnam School of International Studies in Singapore in a recent commentary. ROK is now left with bigger tasks to improve the quality and standard of its indigenous defence productions.

This is a serious case as the progress of its arms export will greatly depend on the trust they can assured to the buyers.

#### **4.5 Lack of Interest on the Part of ROK Industry**

One of the major problems of ROK defence industry is the lack of industry in heavily involved in defence industry. This is due the fact that civilian products are more profitable than the defence products. Although government allowed production of maximum percentage of 30% for defence products, most of the chaebol allocate much lower percentage for the production of defence items. For instance, Samsung allocates 25% of its total business to military work, while Hyundai and Daewoo allocate 15 and 10% respectively (Bitzinger 1995: 244). Even when the government provided huge amount of incentives for arms productions, many companies do not take interest to produce the same. Although ROK defence industries are among some of the largest and most advanced in the developing world, armaments production remains a very small and mostly unprofitable segment of all industrial output. Even in terms of exports, the amount of ROK export items like semiconductors, automobiles, electronics and shipbuilding are increasing in a rapid pace compare to defence items. Among the export defence items, aerospace has been rising compare to other defence items. Most of the companies are more interested in civilian production than military production, where they can achieve greater amount of profits. This has been one of the hindrances for the progress of ROK indigenous defence production.

#### **4.6 Lack of Interest on the Part of Military Personnel**

There is a lack of interest on the part of the ROK military personnel devoting significant time and resources to support indigenous research and development. One of the reasons often cited for the success of Israeli arms industries is their strong relationship with the country's armed forces. In addition, when Israeli army officers retire, they tend to seek employment in the defense industry. This leads to a situation where a lot of combat experience and know-how is directly transferred to the industry. One of the main benefits of such a closed circle is that new lessons from the battlefield could be quickly incorporated into the development of new defense systems, thereby shortening the time from notion to production (*Xinhua News*, Sept.8, 2011). While South

Korean military planners generally support the indigenisation of arms procurement, other factors-such as cost, reliability, and timely availability-tend generally to cause them to favor foreign weapons systems or military technologies over extensive local R&D efforts. The armed forces usually want to obtain the most advanced weapon systems available as soon, and as cheaply, as possible. Off-the-shelf purchases of arms and components, licensing arrangements, or military technology transfers are often found to be easier, faster, and more reliable routes to procuring sophisticated armaments than attempting to innovate with locally available technology (Bitzinger 1995: 245). Therefore, there has been a lack of development of advanced indigenous products which can meet the requirement of the armed forces.

#### **4. 7 Structural Weakness of R&D Base**

ROK local arms industry suffers from a number of structural weaknesses in R&D base. As mentioned earlier, local R&D infrastructures are not big enough, nor are they adequately funded to make sufficient advancement in defence-related areas. Poor linkages between the defence R&D and manufacturing bases and a military production base characterised by a passive management, weak design and systems integration skills, and the lack of long-range R&D planning all conspire to undermine the growth and maturation of ROK's defence industrial base. Despite recent efforts to involve industry more in military R&D, there is surprisingly little overlap between arms designers and arms producers.

Although, there has been a planned to diversify R&D, ROK weapons development is still almost entirely concentrated in government institutions, such as the Agency for Defense Development. For the most part, South Korean companies simply produce military equipment as dictated to by the central government, and therefore the private sector has few inputs into the military R&D process. This, in some cases, creates loopholes in the type of products that the companies are specialised and their areas of interest. ROK is also deficient in design and process technologies, and a paucity of systems integration skills in South Korea means that local military designers and engineers often have a difficult time amalgamating the disparate technologies that comprise advanced weapon systems, such as battle tanks or combat aircraft. Finally, the absence

of clear, long-term planning in ROK military production makes it difficult to invest in basic research or to identify and develop promising technologies (Bitzinger 1995: 245).

Apart from the above mention points, there are various problems faced by ROK defence industry. Some of the problems have been addressed by ROK government in recent years, but has not been eliminated to the full extent. Even after more than 30 of public and private investments, ROK still possesses only limited capacity for meeting its indigenous arms production needs. Overall, while the country's defence technology and industrial base has elevated from a third-tier arms producer to a second-tier arms producers by virtue of considerable effort and investment, much of the local defence sector remains deficient when it comes to innovation and indigenization (Moon and Paek 2008: 1). The country's local arms production is only self-sufficient in small arms, ammunitions and armored vehicles; in most other cases, a considerable proportion of the value of indigenous production is of foreign origin (Bitzinger 2011: 441). It continue to rely heavily upon foreign inputs in critical areas such as, heavy-duty vehicle engines, transmissions, active protective systems, jet engines, airborne radar systems and other avionics, landing gear, early warning and tracking radar, fire control systems, thermal imagers, laser detection sensors, navigation systems, data links, sensor fusion technologies and signal processing.

Over production has also been another problem faced by ROK defence industry, especially during the initial stage of arms production. In the early 1970s, ROK greatly expanded its arms manufacturing capacities in response to the existing or project needs, only to find itself saddled with overlapping and duplicate capacity and underutilized, high-overhead facilities. Since the 1980s, ROK defence industry managed to produce more than the domestic market demand. Since most of the weapons were produced under US license coproduction, this caused serious problems for exporting them to the third-countries. Defence industries in ROK are now producing more than the domestic demand. There is a big challenge for the government to export these products for the long-term sustenance of defncc industry sector.

Underutilisation of resources is another serious that caused a great hindrance to development of ROK defence industry. By the late 1990s, ROK aviation industry operated at less than 50% of

the capacity and was at least one billion dollars in debt (Bruce 1998). Overall, the ROK defence industry operates at around 60% of capacity, although in some capacity utilization is even lower; only 36% in the case of the ordnance and ammunition sectors (Cheng and Chinworth: 250). Overall corporate performance of the defence industry produced mixed results. The operation rate of the defence industry remained at 50% between 1999 and 2004, which was quite low compared to the average operation rate (80.3% in 2004) of the manufacturing sector. Although defence industrial firms met improvements in their ordinary profits since 2002, they suffered huge deficits in the 1990s (Moon and Lee 2008: 132).

Slow progress of the production target in aircraft industry has also hindered the success of defence industry. During the 1990s, ROK possessed four separate aerospace companies, each of whom had invested billion dollars in new factories and production lines, not only to build the F-16 and T-50, but also in response to an ambitious national programme to establish the country as one of the world's leading aerospace producers by the turn of the century. These plans include building an entirely indigenous fighter by 2010, as well as a 100-seat regional jet, neither of which came to fruition.

**Table 13. The Sale and market Share of Top Ten Defence Contractors (2006)**

Rank	Company	Sales (KW billion)	Ratio (%)
1	Samsung Techwin	631.2	11.9
2	KAI	544.7	10.2
3	Samsung Thales	452.7	8.5
4	Hanwa	433.7	8.2
5	Hyundai Heavy Industries	426.6	8.0
	<b>Total (1-5)</b>	2488.9	46.8
6	LIG (1-5) NEX 1	417.0	7.8
7	Doosan Infracore	387.0	7.3
8	Poosan	312.0	5.9
9	Rotem	297.8	5.6
10	STX Engine	193.8	3.6
	<b>Total (1 – 10)</b>	4096.5	77.1

**Source: Moon and Lee 2008**

ROK defence industry has also been dominated by few chaebol, which in turn hinder the growth of Small and Medium-sized Enterprises (SMEs). The defence industry in ROK is small in size and oligopolistic in its market structure. In 2006, the top ten defence contractor's sales accounted for 77.1%, while the top five defence contractors accounted for 46.8% of total market share respectively (Moon and Lee: 130) . In 2008, the top 10 defence contractors' sale accounted for 74% of the total sale. These defence contractors greatly dominate the total market share and have become a hindrance for the promotion of smaller companies.

Defence industry in ROK has also been kept separate from the civilian production in terms of factories, assembly lines and shipyards. There is often little cross-fertilisation with commercial technologies. This makes it harder and provides fewer incentives for civilian industries to participate in military R&D and manufacturing. While, the ROK's domestic defence industry has achieved much in quantitative terms, the overall situation has fundamental problems, such as mass production of mainly conventional weapons, the profit structure of businesses being centered on domestic consumption, weaknesses on part of small-sized defence businesses and low operating rate of 60% (Paek 2010: 201). The ROK's defence industry has grown based on the basic paradigm of Government-led programmes dependent on imported technologies. Due to this situation, the core technologies required for development of sophisticated weapons systems remain at a low level, and the level of dependence on foreign sources for core parts as deepened

#### **4.8 Some Policy Lessons for ROK Defence Industry**

Low level of Research and Development has been one of the major problems faced by ROK defence industry. ROK greatly depends on import of US technology for sophisticated weapons. This has hindered its production capacity and market opportunities. The US restricts transferring core technology, which has created problem for ROK to import. Therefore, in order to overhaul the problem of ROK defence industry, the main task has to be started with the upgradation of its defence R&D and to develop new advanced technology.

First of all, the government and private enterprises should jointly cooperate to achieve more self-reliant in defence industry by enhancing the core technologies. The government should ensure that private businesses possess the capability for development of sophisticated precision weapons so that production for domestic consumption and export promotion can go hand in hand smoothly. The government's diversification of the role of ADD has been a welcome move. But that is not enough for the promotion of defence production. Government should also encourage private businesses by offering loans and tax exemption for the long sustenance.

Secondly, a new defence R&D system should be set up in such a way as to utilise the resources of the private sector positively and effectively and that has private businesses assume certain roles. Such a system will increase the opportunities for the participation of businesses, universities and research institutes in projects for the development of defence science and technology. Private businesses should be given a chance to assume a larger portion of defence R&D and they should be encouraged to increase their investments in R&D. Allocation of fund should be guided by open competition among the chaebols, according to their performance.

Third, a system should be established that bolsters the international network of technological cooperation to help the ROK procure those core technologies it requires. Efforts should be made to first identify the valuable core technologies that the ROK requires and then procure them through licensed production, offset trade, and international joint R&D. ROK should diversify its international technology cooperation to mitigate its dependence on US.

Fourthly, in order to reduce the dominance of few chaebols, small and medium-sized enterprises should be encouraged by providing incentives and tax assumptions. The concentration of defence production in the hands of few private companies does not benefit the small and medium-sized enterprises. Therefore, the government should systematically nurture in order to cope with bottlenecks in supply parts and components. Government should continue, with greater effort, the localisation of parts and components, which it has been doing through the agency of DTaQ.



## **CHAPTER 5**

### **Conclusion**

Indigenisation of defence industry in ROK has undergone various stages of development in the past 40 years. From a third-tier arms producer in the 1970s, it has elevated to a second-tier producer in the last decade. It has been able to export arms to various countries with an export amount of over \$2.4 billion in 2011. Apart from guns, munitions, missiles and tanks, ROK has been able to indigenously produced T-50 advanced jet trainers and KDX-III destroyer ship. These have been landmark achievement for ROK, which has been under the security protection of the US. In the last few years, the progress in ROK defence industry has been fast growing and is seen to be playing a greater role international arms market in the near future, although it may not be a great player.

ROK defence industry was started as an outcome of threat perception from the North Korean military provocation in the late 1960s and the deteriorating US commitment towards ROK security. US President Richard Nixon announcement of the “Guam Doctrine” in 1969 acted as the final call for indigenisation of defence industry in ROK. The initiative taken by President Park Chung-hee has laid the foundation for ROK defence industry. In response to Guam Doctrine, Park set up Agency for Defense Development (ADD) in 1970 and adopted Self-Reliant Defence as one of the guiding principles of Park Chung-hee regime (1961-79). In 1971, ROK received license to manufacture the American designed M-16 rifle. Under Park’s administration, three laws were passed for the promotion of defence industry - Law of Defence Industry 1973, Force Improvement Plan 1974, Defence Tax Law 1975, to finance development of defence industry.

The US has also played a great role in ROK’s indigenisation of defence industry. It was a self-ambitious plan for ROK to be self-reliant without the assistance of US, considering the high level of technology and huge capital involved to set up defence industry. The Nixon Doctrine which called for troops’ withdrawal on the other hand worked to ROK advantage by the liberalising arms and military technology export codes that gave ROK greater access to sophisticated US technology than had ever been before. During the early 1970s, Seoul received 881 free technical

data packages (TDPs) from the US in support of Korean security needs, and the ROK arms industry made use of 124 of these to establish an indigenous manufacturing base for conventional arms. From 1971 to 1981 the ROK received a liberal supply of licenses to manufacture, assemble, or jointly produce a considerable number of US arms products.

In addition to the Nixon Doctrine, the Carter Administration's (1977-1981) policies also gave Korea incentives to promote the growth of an independent arms production capability. The Carter Administration's troop-withdrawal plan in 1977 which was later canceled, served as a major impetus for President Park Chung-hee's administration to accelerate investment in heavy industries - chemicals, metals, and machinery. This investment was to provide the infrastructure needed for a larger defence-industrial programme. At the same time, the Carter administration provided a series of coproduction agreements as a palliative for the US withdrawal policy. These were designed to bolster Korean weapon production capabilities.

The economic growth in Korea in the late 1960s also favoured the development of defence industry. President Park Chung-hee launched the First Five-Year Plan in 1962. This plan was designed to guide the economy through industrialisation, ultimately paving the way to international industrial export markets and self-sufficiency. Since then the economy of Korea grew by 7.8 % in the First Plan (1962-1966), 9.7% in the Second Plan (1967-1971), 10.1% in the Third Plan (1972-1976). From 1962 through 1978, ROK's real gross national product increased at an annual average rate of nearly 10%, and the ROK was transformed from a typical developing country to that of a moderately industrialised nation. As a result, the per capita income increased from merely \$67 in 1953 to \$1605 in 1980. The fast economic growth has laid the foundation for the development defence industry.

The inauguration of Heavy and Chemical Industry (HCI) during the Third Five-Year Plan in 1973 acted as a strong support base for defence industry. Park ordered the commencement of the construction of the Changwon Heavy Machinery Industrial Complex on September 19, 1973 signaling a new era. Industrial Parks Promotion Development Promotion Law on December 24 1973 established a strong legislative underpinning for the construction of five additional industrial complexes, each focused on a specific target industry. Yochon was focused on

petrochemicals, Okpo on shipbuilding, Kumi on electronics, Pohang on steel and Onsan on nonferrous metals. In this mammoth development, especially of defence-related industries, a total of eighty-four companies, including Korea Heavy Machinery, KIA Industries, Dawoo Heavy Industries and Lucky-Goldstar, participated as an act of patriotism. These multinational companies have become the backbone of Korean defence industry. ROK started license production and coproduction of various types of weapons from the importing technology from US in the 1980s. By 1990s it has started producing indigenous weapons and reached a higher level of success in the 2000s.

Under Roh Moo-hyun, ROK underwent military modernisation with an aim to built advance self-reliant defence and buildup of elite military force. In order to establish a truly self-reliant defence capability, the Roh government stepped up domestic defence industry infrastructure by enacting the “Defence Business Act of 2006,” initiated by the presidential office. Roh also advocated for the mitigation of ROK security dependent on US and called for ROK to act as power balancer in Korean peninsula. He encouraged localisation of defence production and pledged to support to meet this end whatever cost it may be. During his administration, ROK was able to produce indigenous weapons like K-9 Self-propelled Artillery, K1A1 Tank, KDX-I, KDX-II, KDX-III, 214-class Submarines (KSS-II or Jangbogo-II), Landing Platform Experimental (LPX), and proposed to launch new projects like manufacturing Patrol Killer Experimental (PKX), KP-SAM Shin-Gung (or Chiron) missiles, military satellite communication equipment, landing-attack armoured vehicle, GOP scientific alert system, next-generation escort vessel, air-to-surface guided missile, and mass production of T-50 Golden Eagle advanced jet trainers.

The creation of the Defense Acquisition Program Administration (DAPA) within the Ministry of National Defence (MND), On January 2, 2006, as a streamlined military procurement agency, replacing the former Defense Procurement Agency (DPA) was a landmark in ROK defence procurement. This independent government agency is in charge of ROK’s procurement and sales of military equipments. Though DADA is established mainly for transparency of defence procurement and efficiency, it also plays a great role in the defence R&D by rendering financial and technical support. The abolition of Specialisation and Departmentalisation System, which virtually limited non-defence companies’ participation in the defence sector in 2008 has opened

new era of competition among defence companies. In the past, only a few companies were allowed to participate in Defence R&D, but now, any company with the technology can do business in the defence area. To minimise confusion and adverse effects resulting from the elimination of the system, DAPA has prepared comprehensive follow-on measures. DAPA played a great role in promoting small and medium size enterprises and promote defence exports.

DAPA has achieved a remarkable success in promoting defence industry and also helps the government in improving the quality and procurement of defence products. DAPA has played a great in the development of modern weapons like, Korea next-generation rifle (K-11), Self-propelled howitzer (K-9), Black Panther (K-2), Next-generation advanced trainer (T-50), Pride of domestic product (KT-1 'Ungbi'/Woong Bee), The crystal of state of the art military science, (Aegis Destroyer), (Dokdo), Hongsangeo (Red Shark), Cheongsangeo (Blue Shark). These are mainly indigenous products designed by ADD and produced by different companies. However, DAPA has also taken part in the acquisition and quality upgradation of the products.

The creation of DTaQ during Roh Moh-hyun's administration under the DAPA was another achievement for ROK defence indigenisation. QTaQ's main purposes are; quality assurance of military supplies and planning, research analysis and evaluation of defence science and technology for future weapon system development. In addition, DTaQ is operating six Defense Venture Centers –Seoul (Combat Material), Daejeon (Ammunition), Daegu (Missiles & Electronics), Sacheon – (Aerospace System), Changwon (Land System), Busan (Naval System) - to invite small and mid-sized businesses to the defence industry and to offer more opportunities to industries, academia and researchers to take part in defense-related R&D programmes, contributing to strengthening Korea's civil and military science & technology power. As a professional research organisation for the entire process of the acquisition of weapon systems, DTaQ is dedicated itself to: providing quality assurance for the acquisition of high-quality military supplies; proposing a path forward for future defence technology regarding R&D efforts and core technology development, and; undertaking integrated management service in defense science and technology.

The Lee Myung-bak administration has followed the defence indigenisation policy of Roh Moo-hyun by supporting the production of sophisticated advanced weapons. In order to secure advanced combat capabilities, new weapons projects like Next Infantry Fighting Vehicle, Improvement of Anti-artillery Detection Radar, Next Landing Ship Tank, Joint Air to surface Stand-off Missile (JASSM), Korean Utility Helicopter, improving the performance of K-55 Self-propelled artillery, improving the performance of the C-130H were undertaken. The budget for Financial Year (FY) 2008 increased by 8% from the preceding year. In order to secure long-range precision capability, MND pursued various programmes to acquire advanced forces including the following: K-9 self-propelled artillery, large caliber MLRS (munitions), Gwanggaette (KDX-III)-class destroyers (Aegis) and Jangbogo-II.

Continued efforts were also made to improve outdated weapons and artillery radar. Efforts to improve air defence were continued by fielding short range anti-air missiles, next surface to air missiles (SAM-X), and newly deployed decontamination vehicles in 2008. In 2010, MND planned to launch new projects for a heavy attack helicopter and the Korean attack helicopter, and Boramae. It also proposed to upgrade the outdated and obsolete combat weaponry. The Army undertook to improve its K-1/K1A1 Tanks, K-200 Armored Vehicles, and K-277 Armored Command Vehicles, K-55 Self-propelled Artillery, and counter-battery detection radars. The Navy also undertook a planned to improve the submarine warfare capabilities of its surface combatants beyond the patrol combat corvette (PCC) level.

Apart from the indigenisation of defence production, the Lee government has gone further by adopting “Defense Industry as the New Economic Growth Engine” in 2008. Lee also pledge to, “fostering the defence industry as a new economic growth engine” at his opening ceremony of 18<sup>th</sup> National Assembly marking the national liberation on August 15, 2008 as one of the “100 Policy Tasks” of his administration. DAPA is spearheading this initiative. Main features of the initiative include promoting defence R&D, improving the business environment in the defence sector, and building a government-wide support system for defence exports. In 2008, it introduced the Master Plan for Domestic Production as groundwork to systematically continue to produce parts domestically. As a result, defence export reached to a remarkable record of \$1 billion in 2008 and hit \$2.4 billion 2011.

The success of ROK defence export has been a remarkable achievement, which was something unimaginable during the 1980s when US restricts ROK arms sale to third countries. This success has been due to the various policies undertaken by ROK government for the promotion of indigenisation of defence production and its export promotion strategies. In order to develop its own products, ROK government support defence R&D through ADD. Initially, this agency developed and designed defence products with international collaboration and gradually developed its own products. Apart from the US, the agency diversified its collaborations with UK, Germany, France and Italy, to lessen its dependence on the former. ROK was allowed exporting some of the weapons produced under co-productions. By now, ROK has developed various weapons of its own products. They are free to sell these products without any restriction from the US, which continues to be a security provider to ROK. However, there have been cases where ROK was asked not to sell arms to certain countries which do not have cordial relationship with US. This does not hamper much to the success of ROK arms export.

ROK being a small country focuses on overseas market for the sustenance in the long run. After successfully exporting arms to countries in Asia and Africa, it is now targeting Latin American countries. The country is targeting export volume of \$4 billion by 2020 to become the 7<sup>th</sup> largest exporter of arms and create 50,000 jobs by that year. In order to achieve such goal, ADD has been diversified to promote private contractors to carry research and development of their own. Except for major, strategic and secret weapons, private firms will be responsible for general weapons development and their efficiency improvement. The Defence Reform Plan 2020, which aims to create a slimmer, stronger and high-tech army and acquire advanced weapons. It has to look for places to export its older ones.

The main reasons for the success of ROK arms export has been due to the high quality and price competitiveness. However, faced with tough competition from countries like US, UK, France, Israel and Italy, the future of ROK's defence export is quite a challenging task. There was a report in early February 2012 that ROK lost to Italy in a bid to sell 30 new supersonic fighter training aircraft. ROK was hoping to conclude a deal of \$1 billion for Israel to purchase T-50

Golden Eagle trainer, but Israel considered Italy's additional incentives to be more favourable. This can be a serious blow to ROK's quest to achieve \$3 billion in defence exports in 2012.

Technology transferred to Turkey in 2008 for the manufacture of K1A1 and K2 Black Panther both jointly developed by ADD and Hyundai Rotem was regarded as a great achievement of ROK defence R&D as it was not only weapons export but also export of technology. However, there has been criticism from some scholars on the ground that such technology transfer without a strict regulation can lead to illegal innovation of technology by the recipient country for its own advantage. Due to its strategic alliance with US, there is also limitation for export of core technologies by ROK to countries like China, which the US considered is a rival power.

The future prospects of the ROK's defence export will depend on how far the government and defence industry can join together to tackle the challenges faced by defence industry. ROK's defence products are and will continue to be competitive in the global market because of their edge in both technology and price. Seoul's K-11 airburst assault rifle is drawing much attention as the world's first multipurpose rifle in production, while its K-21 next-generation infantry vehicle can supposedly outperform the US Army's equivalent.

Whether ROK can sustain this feverish pace of defence modernisation is another question altogether. Lackluster economic growth could scale down Seoul's grand ambitions. As it is, the country has been forced to cut back on its arms plans as GDP rose by over 4% over the last few years, instead of the 7.1% yearly increase envisioned by the defense reform package until 2020. The ambitious plan of ROK can be affected by the financial crisis in the future.

ROK's defence indigenisation has two main objectives – both political and economic. Politically, ROK wanted to build a strong military power so that the country can play greater role in the future. This has been proved during the reign of Roh Mo-hyun, when he pursued a policy for ROK to play a balancer in Northeast Asia. Economically, ROK sees defence export as new economic growth engine. Lee Myung-bak government has taken various measures for the promotion of defence exports. As a result, there has been great success in defence export in recent years. It has bright future prospect to increase its export volume in the coming years.

## References

(\*indicates primary sources)

Ahn, B.J. (1993), “Arms Control and Confidence Building on the Korean Peninsula: A South Korean Perspective,” *The Korean Journal of Defense Analysis*, 5(1): 117–139.

Amsden, Alice (1989), *Asia’s Next Giant: South Korea and Late Industrialization*, New York: Oxford University Press.

Baek, Kwang-il and Moon, Chung-in (1989), “Technological Dependence, Supplier Control and Strategies for Recipient Autonomy: The Case of South Korea”, in Kwang-il Baek et al. *The Dilemma of Third World Defense Industry: Supplier Control or Recipient Autonomy*, Inchon: CIS-Inha University.

Bennet, Bruce W. (2006), “A Brief Analysis of the Republic of Korea’s Defense Reform Plan” *National Defense Research Institute*, [Online: web] Accessed Jan.25, 2012 URL: [http://www.rand.org/pubs/occasional\\_papers/2006/RAND\\_OP165.pdf](http://www.rand.org/pubs/occasional_papers/2006/RAND_OP165.pdf)

Bitzinger, Richard A. (2002), *Towards a Brave New Arms Industry? The Rise and Fall of Second-Tier Arms-Producing*, Adelphi Paper, London: International Institute for Strategic Studies.

Bitzinger, Richard A. (1995) “South Korea’s Defense Industry at the Crossroads,” *The Korean Journal of Defense Analysis*, 7(1): 233–249.

Bitzinger, Richard A. (2011), “China’s Defense Technology and Industrial Base in a Regional Context: Arms Manufacturing in Asia”, *Journal of Strategic Studies*, 34 (3): 425-450

Bitzinger, Richard A. and Kim, Mikuong, (2005), “Why Do Small states Produce Arms: The Case of South Korea”, *The Korean Journal of Defense Analysis*, 18 (2):182-205

Brauer, Jurgen and Dunne, Paul (2002), *Arming the South: the economics of military expenditure, arms production, and arms trade in developing countries*, London: Palgrave Macmilan.

Cha, Victor D. (2001) “Strategic Culture and the Military Modernization of South Korea” *Armed Forces & Society*, 28 (1): 99-127

Cheng, Dean and Chinworth, Michael W. (1996), “The Teeth of the Little Tigers: Offsets, Defense Production and Economic Development in South Korea and Taiwan” in Stephen Martin *The Economics of Offsets: Defense Procurement and Countertrade*, New Jersey: Harwood Academic Publishers.

Cho, Lee-Jay and Kim, Yoon Hyung (1991), *Economic Development in the Republic of Korea: A Policy Perspective*, Hawaii: East-West Center Press.



Confer, Brian S. (2008), *An Analysis of Second-tier Arms Producing Countries Offset Policies: Technology Transfer and Defense Industrial Base*, Ohio: Air force Institute of Technology

Cordesman, Anthony H. (2011), *The Korea Military Balance 2011: Comparative Korean Forces and the Forces of Key Neighbouring States*, Washington DC: Centre for Strategic and International Studies

\*DAPA (2012), Defense Acquisition and Procurement Agency, “*New Weapons Development*” [Online: web] Accessed April 21, 2012 URL: <http://www.dapa.go.kr/eng/policy/weapons.jsp>

Drifte, Richard (1997), “Proliferation in Northeast Asia; South Korea’s Dual-Use Technology Imports from Japan”, *Nonproliferation Review/Spring*

Feffer, John (2009), “Ploughshares into swords; Economic implications of South Korean Military Spending” *On Korea* (2): 1-25

Franco, Jenny and Broek, Martin (2001), “Up in Arms: Europe’s Arming of South Korea and its Implication for Peace in East Asia” in Brennan, Bried, *Ending the Cold War in the Korean Peninsula & The Search for Global Peace*, Amsterdam: Transnational Institute with Focus on the Global South.

Fujita, Natsuki and James, William E. (1989) “Export Promotion and the Heavy Industrialization of Korea”, *The Developing Economies*, 27(3)

Girling, GLS (1970), “The Guam Doctrine”, *International Affairs*, 46(1): 48-62

Gonn, Adam (2011), “News Analysis: South Korea becoming major Israeli arms client” [Online: web] Accessed April 5, 2012 URL: [http://news.xinhuanet.com/english2010/indepth/2011-09/08/c\\_131114561.htm](http://news.xinhuanet.com/english2010/indepth/2011-09/08/c_131114561.htm)

Ha, Young-Sun (1984), “South Korea” in James Everett Katz, *Arms Production in Developing Countries: An Analysis of Decision Making*, Lexington: Lexington Books D.C. Heath and Company

Hamm Taik-young (2006), “The Self-Reliant National Defense of South Korea and the Future of the U.S.-ROK Alliance,” NAPSNET Policy Forum, [Online: web] Accessed Oct. 10, 2011 URL: <http://nautilus.org/napsnet/napsnet-policy-forum/the-self-reliant-national-defense-of-south-korea-and-the-future-of-the-u-s-rok-alliance/>

Hamm, Taik-young (1999), *Arming the two Koreas: State, Capital and Military Power*, London: Routledge.

Han, Young-sup (2006), "Analyzing South Korea's Defense Reform", *The Korean Journal of Defense Analysis*, 18 (3):111-134

Harris, Sally (1999), "South Korea wanting to go alone" *The RUSI Journal*, 144 (4) 57-63

Harvie, Charles and Lee Hyun-Hoon (2003), Export Led Industrialisation and Growth –

Korea's Economic Miracle 1962-89, Accessed 13 September URL:  
<http://www.uow.edu.au/commerce/econ/wolist.html>

Heo Uk, (1996) "The Political Economy of Defense Spending in South Korea," *Journal of Peace Research*, November

Heo Uk, (1999) "Defense Spending and Economic Growth in South Korea: The Indirect Link," *Journal of Peace Research*, November

Hutchinson, George. A (1998), *Republic of Korea Weapon Acquisition Through the Post-Cold War and the Case of the SAM-X Project: Implications for US-ROK Relations*, M.Sc (Logistics Management) Thesis, Ohio: Air Force Institute of Technology.

Hutchinson, George A. (1999), "View Towards Change: The United States-Republic of Korea Arms Trade Relationship Through the Post-Cold War", *Air Force Journal*, 23(1): 1-8

Hwang, Dong Joon (1996) The Role of Defense Industry in Innovation and the Development of Dual-Use Technology, *The Korean Journal of Defense Analysis*, 8 (1): 264-176

Inbar, Efraim and Zilbarfarb, Benzion (1998), *Politics and Economics of Defense Industries*, London: Frank Cass Publisher

Jackson, Susan T. (2011), "Arms production" in Cruickshank, D.A. at al. (eds.) *SIPRI Year Book 2011: Armaments, Disarmament and International Security*, New York: Oxford University Press.

Jeong, Kyeung-Ihn and Heshmati A. (2009), "Efficiency of the Korean Defense Industry: A Stochastic Approach", *Productivity, Efficiency, and Economic Growth in the Asia-Pacific Contribution to economics*, Vol.3: 217-254

Joon, Hwang Dong (1985), "South Korea's Defense Industry: An asset for the U.S.", *The Heritage Foundation, Backgrounder*, No. 38, December 10.

Jung, Sung-ki (2007), "S. Korean Arms Makers Tap Global Market" [Online: web] Accessed February 10, 2011, URL:  
[http://www.koreatimes.co.kr/www/news/nation/2010/01/205\\_6703.html](http://www.koreatimes.co.kr/www/news/nation/2010/01/205_6703.html)

Jung, Sung-ki (2010), "Korea Emerges as Arms Development Powerhouse", *Korea Times* June 16, 2010 [Online: web] Accessed Jan.9, 2012 URL:  
[http://www.koreatimes.co.kr/www/news/nation/2010/07/205\\_67771.html](http://www.koreatimes.co.kr/www/news/nation/2010/07/205_67771.html)

- Kapstein, E. (1994), "America's Arms-Trade Monopoly", *Foreign Affairs*, 73(3): 13–19.
- Kim, hung-yum (2011), *From Despair to Hope: Economic Policymaking in Korea, 1945-1979*, Seoul: Korea Development Institute.
- Kim, Hyung-A (2004), *Korea's Development Under Park Chung Hee: Rapid Industrialization, 1961-79*, New York: Routledge.
- Kinsella, David (2000), "Arms production in the third tier: An analysis of opportunity and willingness", *International Interactions*, 26( 3): 253-286
- Korkmaz, Kaan and Rydqvist (2012), *The Republic of Korea: A Defence and Security Primer*, Stockholm: Swedish Defence Research Agency.
- Krause, Keith, (1995), *Arms and the State: Patterns of Military Production and Trade*, Cambridge: Cambridge University Press.
- Lee, Choon Kun (2000), "Arms Build Up Phenomenon in East Asia: Patterns and Causes", *The Korean Journal of Defense Analysis, Summer*.
- Lee, Tae-hoon (2012), "Korea eyes tenfold growth of defense exports", [Online: web]
- Lee, Yong Hak (1992), *Defense Industry and Its Impacts on Economic Growth in Korea*, M.Sc (Logistics Management), California: Naval Postgraduate School.
- Lee, Yonsuk and Markusen, Ann (2003), "The South Korea defense Industry in the post-Cold War Period, in *From Defence to Development: International Perspective on Realizing the Peace Dividend*, ed. Ann Markusen, Sean Di Giovanna et.al. London: Routledge Studies in Defence Economics.
- Moon Chung-in and Hyun In-taek, (1992) "Muddling through Security, Growth and Welfare: The Political Economy of Defense Spending in South Korea," in *Defense, Welfare and Growth*, ed. Steve Chan and Alex Mintz, London: Routledge.
- Moon Chung-in and Hyun Jin-young (2008), "Revolution in Military Affairs and the Defense Industry in South Korea," *Security Challenge*, 4(4): 117-134
- Moon, Chung-in and Paek, Jae-ok (2010), "Defense innovation and industrialisation in South Korea, *Study of Innovation and Technology China*, Policy Brief No.14
- Moon, Hee-Jung (2010), "The Diamond Approach to the Competitiveness of Korea's Defense Industry: From the Park, Chung-hee to Lee, Myung-bak", *Journal of International Business and Economy*, 11(2): 69-111

Moon, Hyoungill (2007), *South Korea's Current Status of FMS*, M.Sc (Logistics Management) Thesis, Ohio: Air Force Institute of Technology.

Na, Jeong-ju (2010), "Korea Seeks to Become Major Arms Exporter", [Online: web] Korea Times Oct.19, URL: [http://www.koreatimes.co.kr/www/news/nation/2010/10/116\\_74835.html](http://www.koreatimes.co.kr/www/news/nation/2010/10/116_74835.html)

Nam Chang-hee,(2007), "Realigning the U.S. Forces and South Korea's Defense Reform 2020," *Korean Journal of Defense Analysis*, 19(1): 165-189

Nolan, Janne E. (1986), "South Korea: An Ambitious Client of United States" in *Arms Production the third World Countries*, ed. Michael Brzoska and Thomas Ohlsen, London: Taylor and Francis Publication.

Nolan, Janne E. (1986), *Military Industry in Taiwan and South Korea*, Hong Kong: Macmillan.

Ohlson, Thomas and Brzoska, Michael (1986), *Arms Proliferation in The Third World*, Stockholm International Institute of Peace Research, London: Taylor and Francis Publication.

Paek, Jae-ok (2010), "Defense Science and Technoogy of the ROK and Desirable directions for Relevant R&D Policies", *The Korea Journal of Defense Analysis*, 22(2): 197-215

Park, Dayea Diana (2009), "South Korea Weapons Exports", *Journal of Politics and Society*, 76 (3): 19-38.

\*Republic of Korea (2003), *Defense White Paper 2003*, Ministry of National Defense, Seoul.

\*Republic of Korea (2006), *Defense White Paper 2006*, Ministry of National Defense, Seoul.

\*Republic of Korea (2008), *Defense White Paper 2008*, Ministry of National Defense, Seoul.

\*Republic of Korea (2010), *Defense White Paper 2010*, Ministry of National Defense, Seoul.

Rhee, Jong-Chan (1994), *The State and Industry in South Korea: The Limits of the Authoritarian State*, London: Routledge.

Rozman, Gilbert at al. (2008), *South Korean Strategic Thought Toward Asia*, New York: Palgrave Macmillan.

Scanlan, Craig (2011), "South Korea hits \$2.4 Billion in Arms Export for 2011", [Online: web] Accessed January 21, 2011 URL: <http://asw.newpacificinstitute.org/?p=10197>

Scanlan, Craig (2012), "South Korean Defense Industry Suffers First Major Defeat of 2012" [Online: web] Accessed Feb.12, 2012 URL: <http://asw.newpacificinstitute.org/?p=10104>

Shin, Hyon-hee (2011), "Seoul Sets up Coordinator for Arms Exports" Asia News Network [Online: web] Ac <http://www.asianewsnet.net/home/news.php?id=21430&sec=2>

Singer, P.W. (2003), *Corporate Warriors: The Rise of the Privatized Military*, London: Cornell University Press.

Singh, Ravinder Pal (1998), *Arms Procurement Decision Making Volume I: China, India, Israel, Japan, South Korea and Thailand, Volume I*, London; Oxford University Press.

Sorenson, David S. (2010) "Arming the Pacific Rim: Explaining Asian Arms Sales Patterns after the Cold War", Lecture delivered on July 1, 2010 at the IV Oceanic Conference, Auckland New Zealand.

Innovation Norway (2008), *South Korea Defence Industry*, [Online: web] Accessed Mar. 10, 2012 URL: [http://s3.amazonaws.com/zanran\\_storage/www.innovasjon Norge.no/ContentPages/22442782.pdf](http://s3.amazonaws.com/zanran_storage/www.innovasjon Norge.no/ContentPages/22442782.pdf)

South Korea: Goals and Strategy for Building Defense Industries in *Arming Our Allies: Cooperation and Competition in Defense Technology*

Suh, Jae-Jung (2009), Allied to Race? The U.S.-Korea Alliance and Arms Race, *Asian Perspective*, 33 (4): 101-127.

The US Government (1990), "South Korea: Goals and Strategy for Building Defense Industries", *Arming Our Allies: Cooperation and Competition in Defense Technology*, Washington DC

\*U.S. DOS (2011), U.S. Department of State, Directorate of Defense Trade Control, "International Traffic in Arms Regulations 2011" [Online: Web] Accessed May 5, 2012 URL:[http://pmdtdc.state.gov/regulations\\_laws/itar\\_official.html](http://pmdtdc.state.gov/regulations_laws/itar_official.html).