



Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

- Enhancing the International Competitiveness of the Korean National Defense Industry

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Agency for Defense Development



Overview

- Introduction
- Development of International Competitiveness Analysis Model for the Korean National Defense Industry
- International Competitiveness Analysis of the Korean National Defense Industry Using the Pentagon-Defense 8 Factors Model
- Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy
- Conclusions
- **ADD Overview**



Introduction

■ Global defense management environment

- Most nations have focused their energies on enhancing the economic and technological powers instead of on reinforcing their military power.
- The powerful military nations steadily carry out various national projects, transforming military companies into civil companies.
- They have also accomplished the military transformation based on the Effect-based Operation (EBO) to transform the defense industrial base.
- The NDI can't be maintained by the long-sustained government control and support anymore along with the reinforcement of the WTO system and the increase of global competition.

■ Korea's defense management environment

- For the past 40 years, the NDI has been promoted strongly by government initiatives.
- Korean defense companies don't have the capabilities to research and develop the most advanced weapons to be competitive internationally.
- The international competitiveness of the Korean NDI is very low in comparison with that of developed countries.



Introduction

■ Prior works

- A great deal of extensive research must be conducted in an effort to discover the proper strategy to strengthen the international competitiveness for the NDI.
- Due to the lack of competitiveness analysis model, there haven't been any considerable efforts to research or to develop the systematic improvement methodologies to solve the above-mentioned problems.
- An original analysis model, which fully takes into account the defense characteristics based on the civil industries model, is required.

■ Purposes of this research

- To develop and validate the optimum analysis model for the Korean NDI, based on the analytic results for various existing models and the consideration of the NDI's unique characteristics.
- To analyze and review the international competitiveness of the Korean NDI by applying the proposed model.
- To suggest the reinforcement strategy that may enhance the global competitiveness of the Korean NDI.



Development of Int. Competitiveness Analysis Model for Korean NDI



Characteristics of the Korean NDI

- The NDI is a government-dependant industry contributing to national security and showing monopolistic and oligopolistic characteristics under government control and support.
- The NDI is an industry that contributes and enhances the national military power and fosters the national economy. Therefore, its economical efficiency isn't considered.
- The military authorities require the military materiel with the best quality rather than at the lowest cost. And the government controls the demand and supply within the scope of the defense budget and the quantity of each service's request.
- Excessive plant investment and the long-term diversion of capital from the defense industry are required. Thus, the operating rate is very low, and the quantity is unstable and limited depending upon the government policy.

Development of Int. Competitiveness Analysis Model for Korean NDI



Korean Acquisition Process of Defense Materiel

- **Restructuring of the entire acquisition system in 2006**
 - One of the goals of this was to redirect the government acquisition policy to *Defense Reform 2020*, stressing self-reliant defense based on the Korea-US alliance.
 - Other goals were to pursue the transformation for Technological Forces and to effectively increase the investment in the defense R&D (research and development) budget (6.5% average).
 - The guidelines for this key acquisition reform were to:
 - Require transparency
 - Increase efficiency
 - Secure expertise and professionals
 - Enhance competitiveness
 - Strengthen international cooperation

Development of Int. Competitiveness Analysis Model for Korean NDI

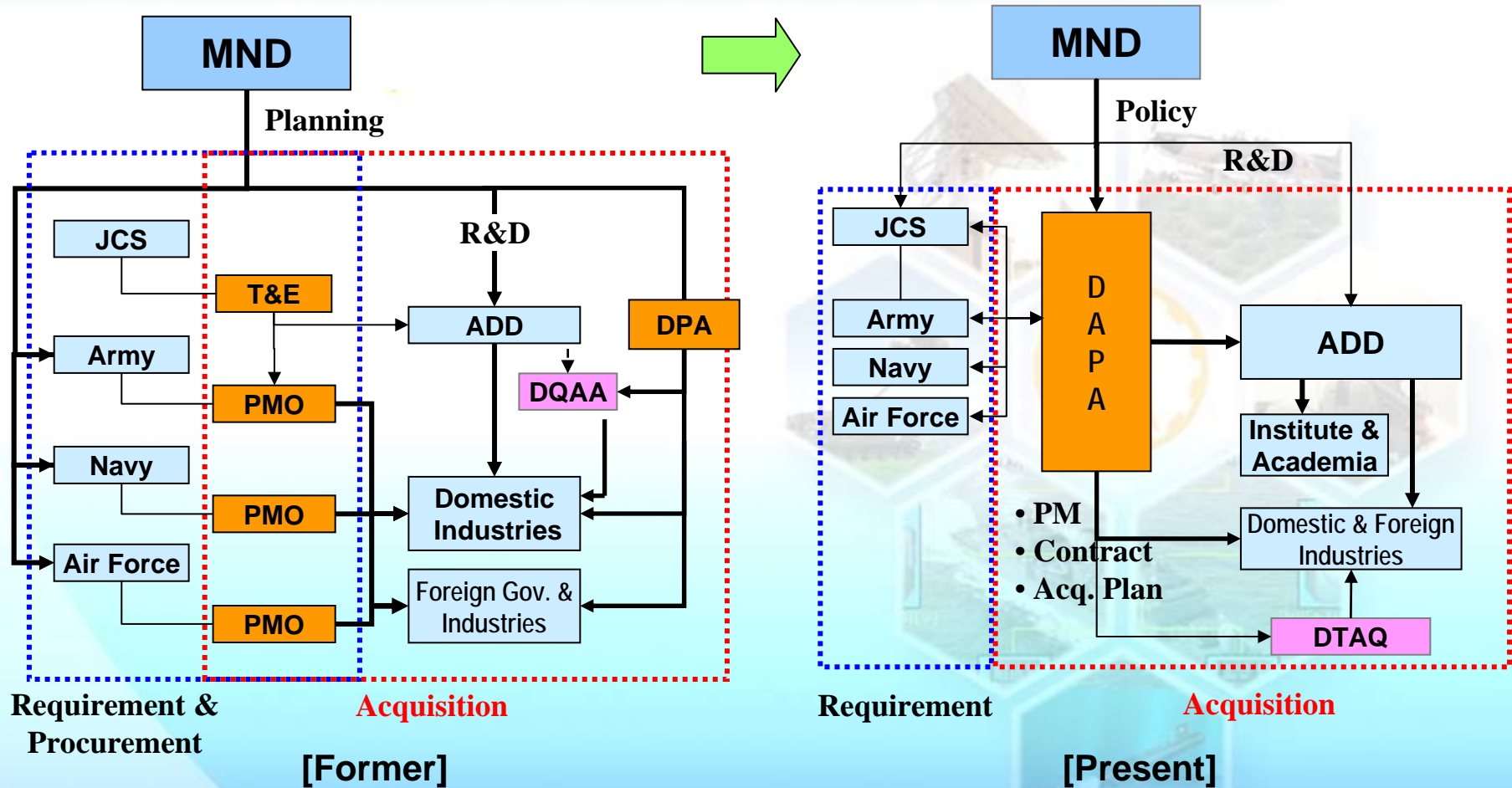


Figure 1. Key Thrusts for Acquisition Reform (Reorganization)

Development of Int. Competitiveness Analysis Model for Korean NDI

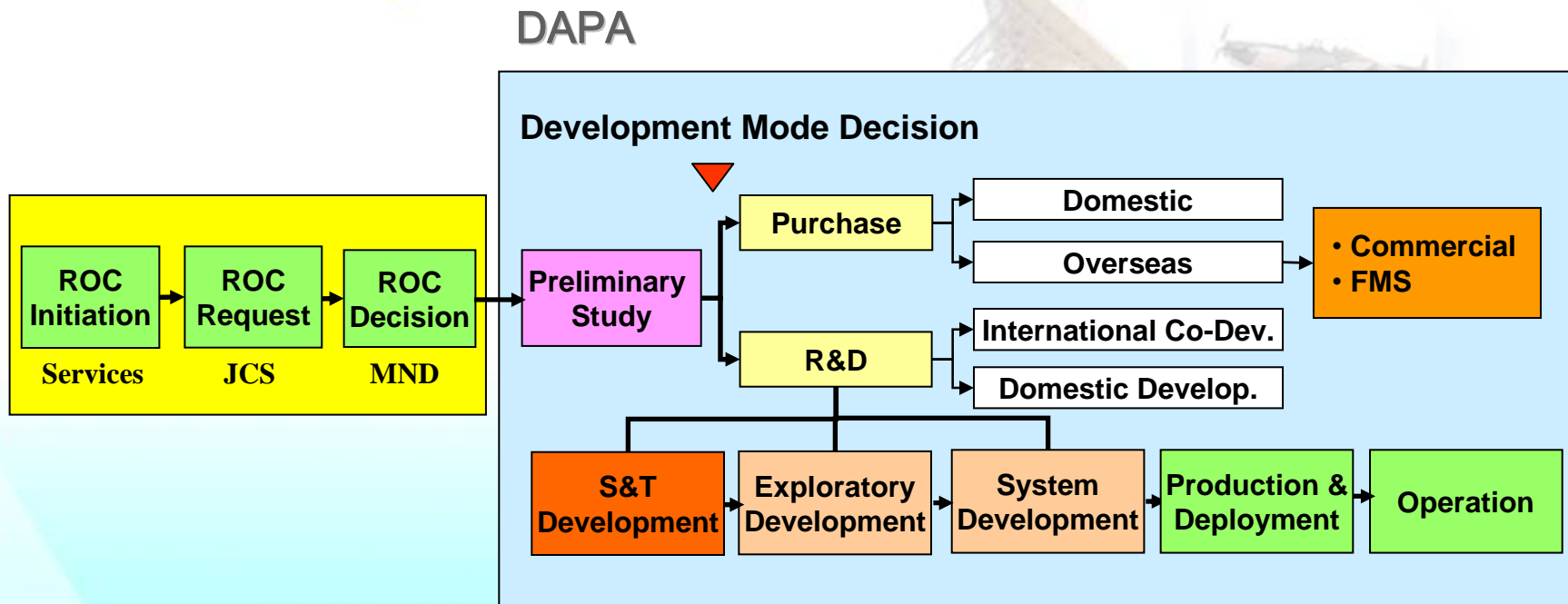


Figure 2. Acquisition Process, Including System Development Flow

Development of Int. Competitiveness Analysis Model for Korean NDI



Figure 3. Organization of Defense Acquisition Program Administration (DAPA)



Development of Int. Competitiveness Analysis Model for Korean NDI



Int. Competitiveness Analysis Model for the KNDI

- The existing civil competitiveness models are insufficient for analyzing the Korean NDI because of its different characteristics.
 - The rule of market economy doesn't work, as the operations of most firms are under the government's control.
 - The sole consumer is the government, and the NDI's supply and the government's demand always meet in the market.
 - All competitiveness factors in the NDI are dictated by the government's intention and policy.
 - The foreign policy and international relations of the major powerful nations are also important factors.
 - Chance is important because it creates discontinuities and plays its role partly by altering conditions in the competitiveness models.
- The optimum analysis model for the Korean NDI is composed of:
 - 5 determinants to achieve the national competitive advantages
 - 3 influencers of true competitiveness

Development of Int. Competitiveness Analysis Model for Korean NDI

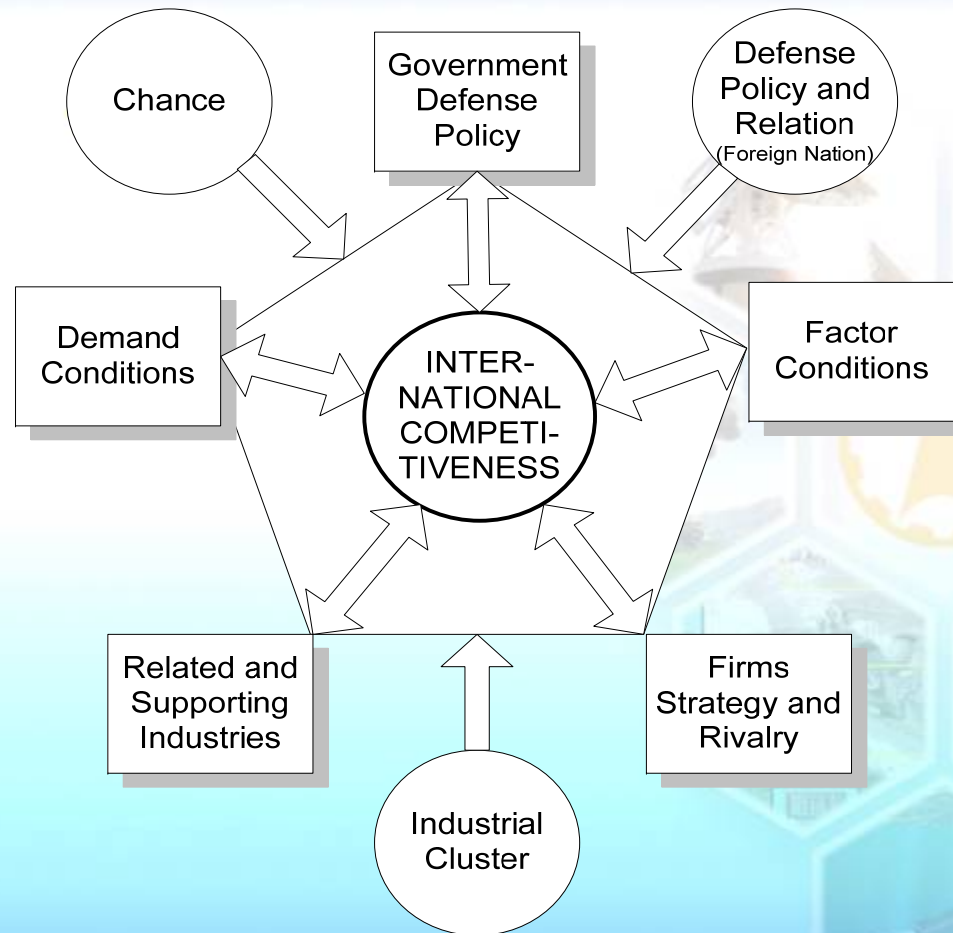


Figure 4. The Pentagon-Defense 8 Factors Model for the Korean NDI



Development of Int. Competitiveness Analysis Model for Korean NDI

Table 1. Determinants and Influencers of P-D8F Model for the KNDI

Determinants and Influencers		Factors for National Competitiveness Advantage
Deter- minants	Factor Conditions	- Human, physical, knowledge, and cap. Resources, nrastructure • Mechanisms creating competitive advantage
	Demand Conditions	- Demand size and pattern of growth, Home demand composition - Internationalization of domestic demand
	Related and Supporting Industries	- Presence of int. competitive supplier and related industry - Competitive advantage of supplier and related industry
	Firms Strategy and Rivalry	- Vision, goal, leadership, and management strategy - Rivalry among existing competitors and threat of a new entrant
	Government Defense Policy	- Policies toward defense acquisition and capital market - Product standard and regulation - Capital market regulation, tax policy, and antitrust law
Influen- cers	Industrial Cluster	- Presence of industrial park and complex, high- tech. park - Existence of cluster for several industries
	Defense Policy and Relation (Foreign Nation)	- Political decision by foreign government - Variations of int. defense environment and military expenditure - Regulations of arms export and technology transfer
	Chance	- Invention, technology innovation, and oil shock - Significant shift in world fin. market, Int. dispute and reg. war

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Factor Conditions

- In 2007, the Korean NDI was composed of 88 companies producing diverse systems and components of 10 fields of defense materiel.
- Yet, they show very low operating rate of 50% to 60%, low profit margins of 8.1%, and very low revenue per capita of \$240 million.
- All data hardly come up to those of Korean civil industries and foreign countries.
- The international competitiveness of the Korean NDI in the world market is very weak.
- The continuous-growth strategy must be propelled by defense reform and self-reliant cooperation.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

Table 2. Variations of Operating Rate for the Korean NDI

Year	1990	1992	1994	1996	1998	2002	2003	2004	2005	2006
Operating Rate (%)	58.2	59.8	56.1	55.7	57.4	54.5	57.3	56.1	57.8	60.6

Table 3. Productivity & Technology Capability for the Korean NDI in 2005

Item	Return On Equity (%)	Revenue Per Capita (\$M)	Operating Rate (%)	Tech. Level (%)
Figures	8.1	240	57.8	67
Remarks (civil industries)	12.2	500	79.8	80

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

Table 4. Variations of Full-time Employees for the Korean NDI

Year	1988	1991	1996	2002	2003	2004	2005	2006
Number	23,418	27,794	29,640	23,179	23,184	23,007	22,226	20,912

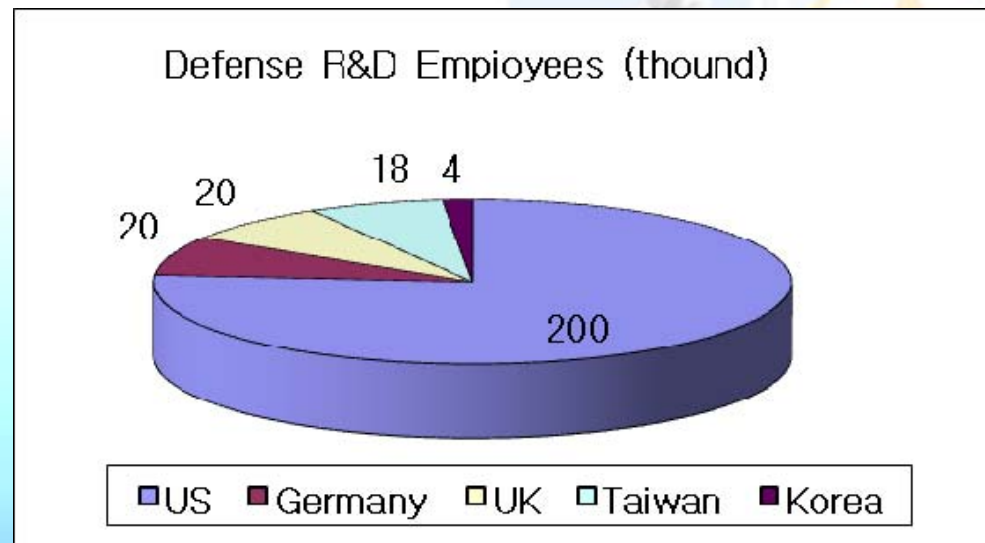
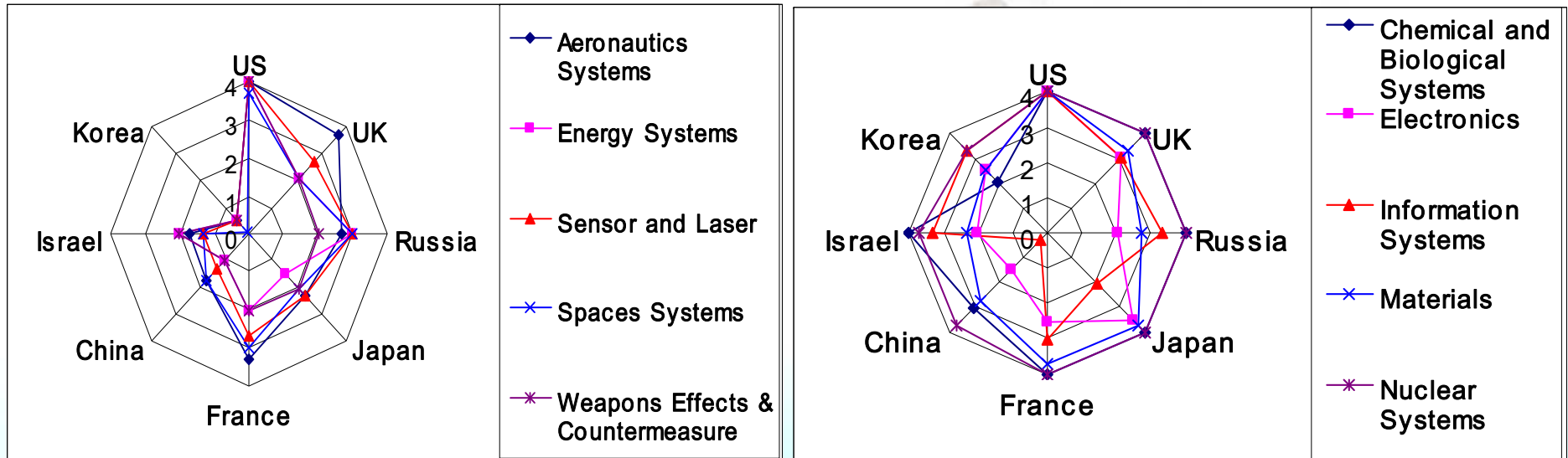


Figure ref. The Number of Defense R&D Employees in the Government

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



(a) Aeronautics / Energy / Sensor and Laser / Spaces / Weapons Effects

(b) Chemical and Biological / Electronics / Information / Materials / Nuclear

Figure ref. Korea's Military Critical Technology Levels

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

Table 5. Variations of Defense Budget and Defense R&D Budget

Year	1990	1992	1996	1998	2002	2003	2004	2005	2006
Defense Budget (\$M)	6,608	8,309	12,243	13,800	16,364	17,515	18,941	20,823	22,513
Defense R&D Budget (\$M)	143	235	374	479	723	739	797	929	1,060
Rate (%)	2.1	2.8	3.1	3.5	4.4	4.2	4.2	4.5	4.7

Table 6. Defense R&D Budget for Major Nations (2005)

Country	US	UK	France	Italy	Japan	Russia	Korea
Defense Budget (\$100M)	4,782	483	462	272	421	210	162
Defense R&D Budget (\$100M)	822.5	46.9	48.5	6.8	15.2	23.7	7.4
Rate (%)	17.2	9.7	10.5	2.5	3.6	11.3	4.5

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

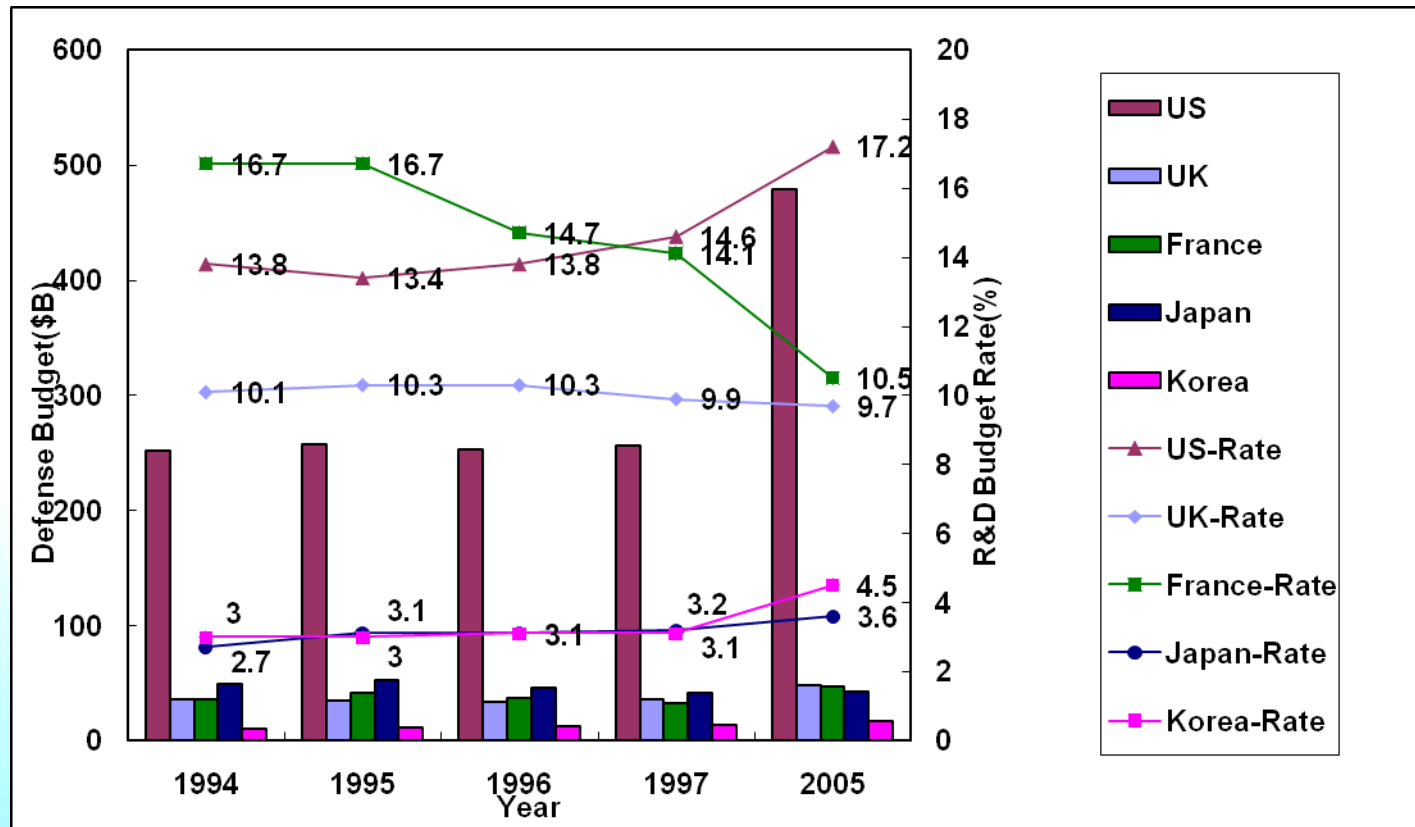


Figure ref. Variations of Defense Budget and Defense R&D Budget Rate for Major Nations

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Demand Conditions

- Demand is decided within the scope of requirements of the services and the defense budget.
 - The materiel improvement programs of the Armed Forces are established by the MND and the DAPA through a 5-year, mid-term plan.
 - The procurement budget is finally set with the adjustment and deliberation of the government and the National Assembly annually.
 - This situation quite restricts the NDI from establishing a mid- and long-term management plan.

- Korean domestic demand for defense materiel has been limited because services want the cutting-edge weapon systems, yet the NDI lacks critical technologies. The core technology level compared to that in leading countries is 67% in 2004.

- Industry promotion is restricted due to the insufficient domestic demand, and the creation of a new market is ineffective.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

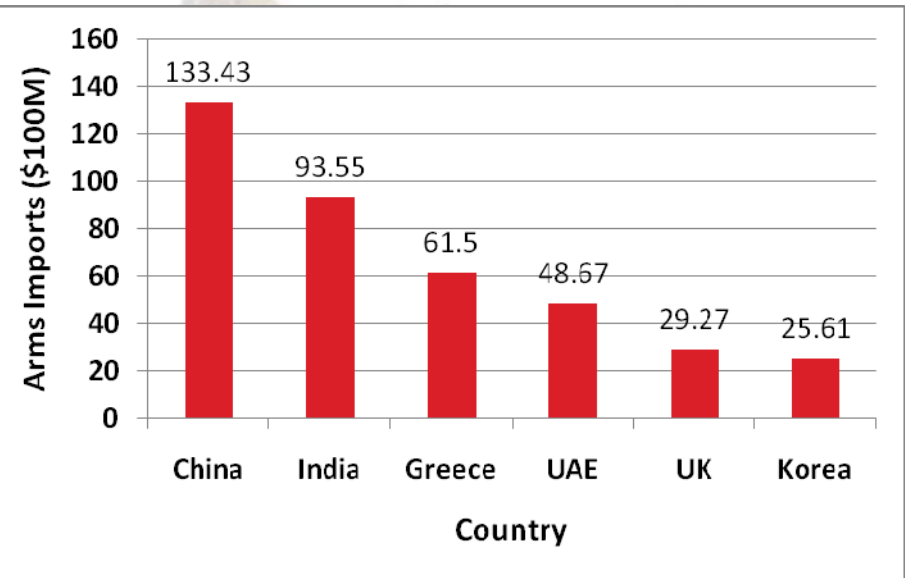
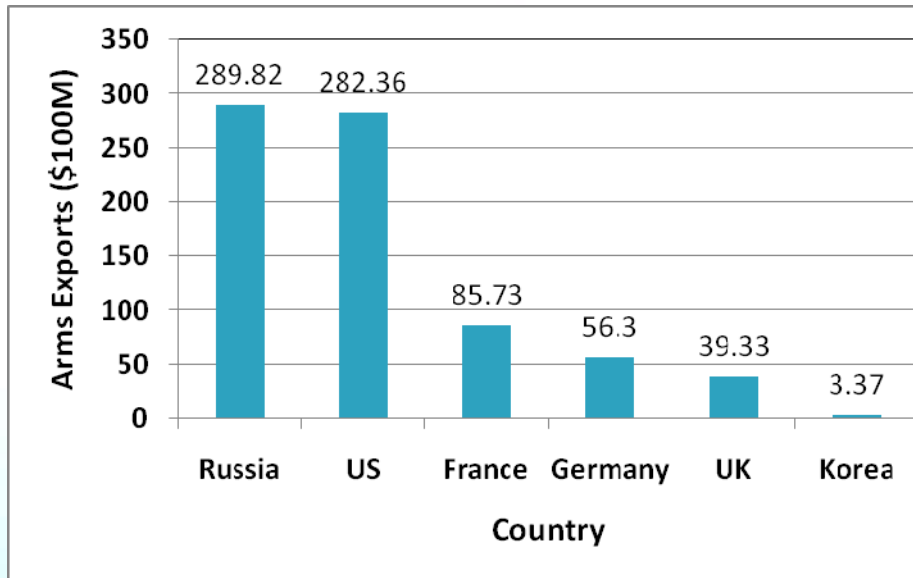
Table 7. Variations of Gross Sales for the Korean NDI

Year	2001	2002	2003	2004	2005	2006
Total Sales (\$M)	3,705	4,366	4,269	4,644	5,317	5,452
Growth Rate (%)	11.1	17.8	-2.3	8.8	14.5	2.5
Operating Income (\$M)	221	151	154	141	250	267
Ordinary Income (\$M)	-115	25	56	86	149	163

Table 8. Variations of Arms Export Sales for the Korean NDI

Year	1991	1995	1999	2001	2002	2003	2004	2005	2006
Export Sales (\$M)	90.6	77.0	196.6	237.2	143.9	240.6	417.8	262.3	255.2

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



(a) Arms Exports

(b) Arms Imports

Figure ref. Military Sales for Major Countries (2001-2005)

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Related and Supporting Industries

- The Korean NDI is composed of 88 main companies, producing the 373 kinds of defense materiel. And 20 to 100 subcontractors work with these main contractors.
- There are also some defense-related organizations and civil-related industries that interconnect to develop and produce the defense materiel.
- The Korean NDI is classified into two structures with vertically and horizontally specialized relations.
- The pyramidal configuration of the Korean NDI is constructed with:
 - The vertical relations among main contractors, subcontractors, and components suppliers
 - The horizontal relations among weapon industries producing particular weapons such as fire power, automobiles, aeronautics, warship, and missile systems, etc.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

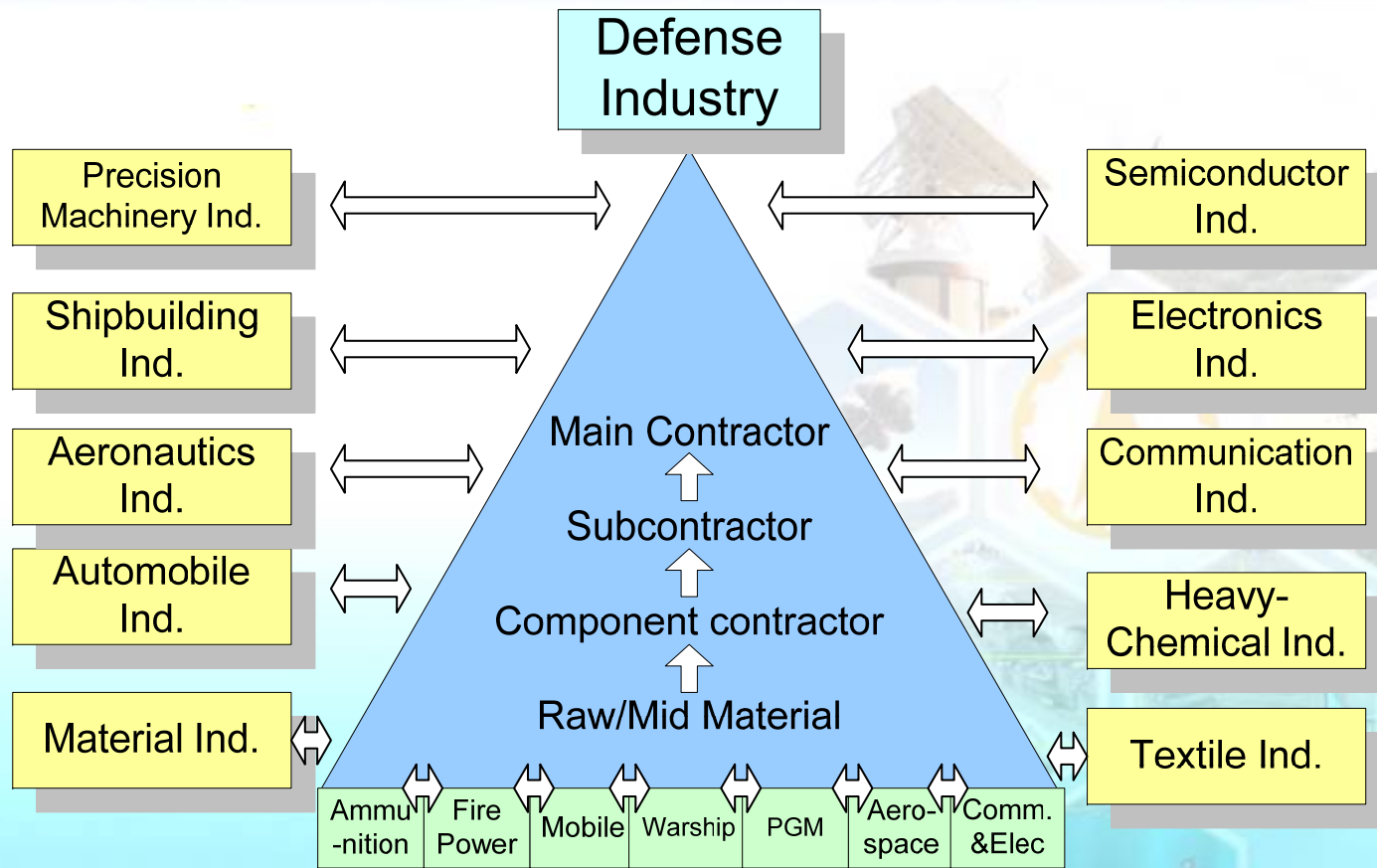


Figure 5. Pyramidal Configuration of Related and Supporting Industries for the Korean NDI

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Firms Strategy and Rivalry

- Most Korean defense firms lack competitiveness due to the monopolistic and oligopolistic systems of the Korean NDI.
 - The entry barrier of newcomers is very high, and most firms make fewer efforts to develop the advanced critical technologies.
- Defense revenue is only 7.8% of the defense industry's total sales in 2005, and the low productivity of most firms impedes the progress of the defense industry.
- Firms are faced with excessive financial cost due to their lack of budget compared to initial investment in large-scale R&D projects.
- The aggressive management strategy of industries isn't established enough. Entrepreneurs and employers don't formulate great visions and goals for their companies because there is almost no rivalry among existing competitors or threat of new entrants.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Government Defense Policy

- Despite numerous attempts to improve the Korean acquisition system, the issues of inefficiency and noncompetitiveness within the defense industry are not yet resolved.
- The government has tried to initiate drastic improvement in defense acquisition policy.
 - The domestic R&D of advanced military materiel takes precedence over overseas acquisition.
 - The government has tried to establish acquisition plans that ensure the balanced development of advanced military materiel.
 - The government has discontinued the specialization and grouping system of the defense companies to improve industry competitiveness.
- The government has endeavored to work in close cooperation with defense companies to enhance exports, and has reinforced the export administration to support them.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Industrial Cluster

- National competitive advantage is generally more remarkable in industrial clusters than in individual industries.
- Industrial clusters often emerge and begin to grow naturally, such as Silicon Valley in the US.
- In Korea, government policy initiated many industrial clusters, such as industrial parks, complexes, and high-technology parks in several areas.
- The government has established some special industrial and R&D regions by providing specialized infrastructures and technical centers.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

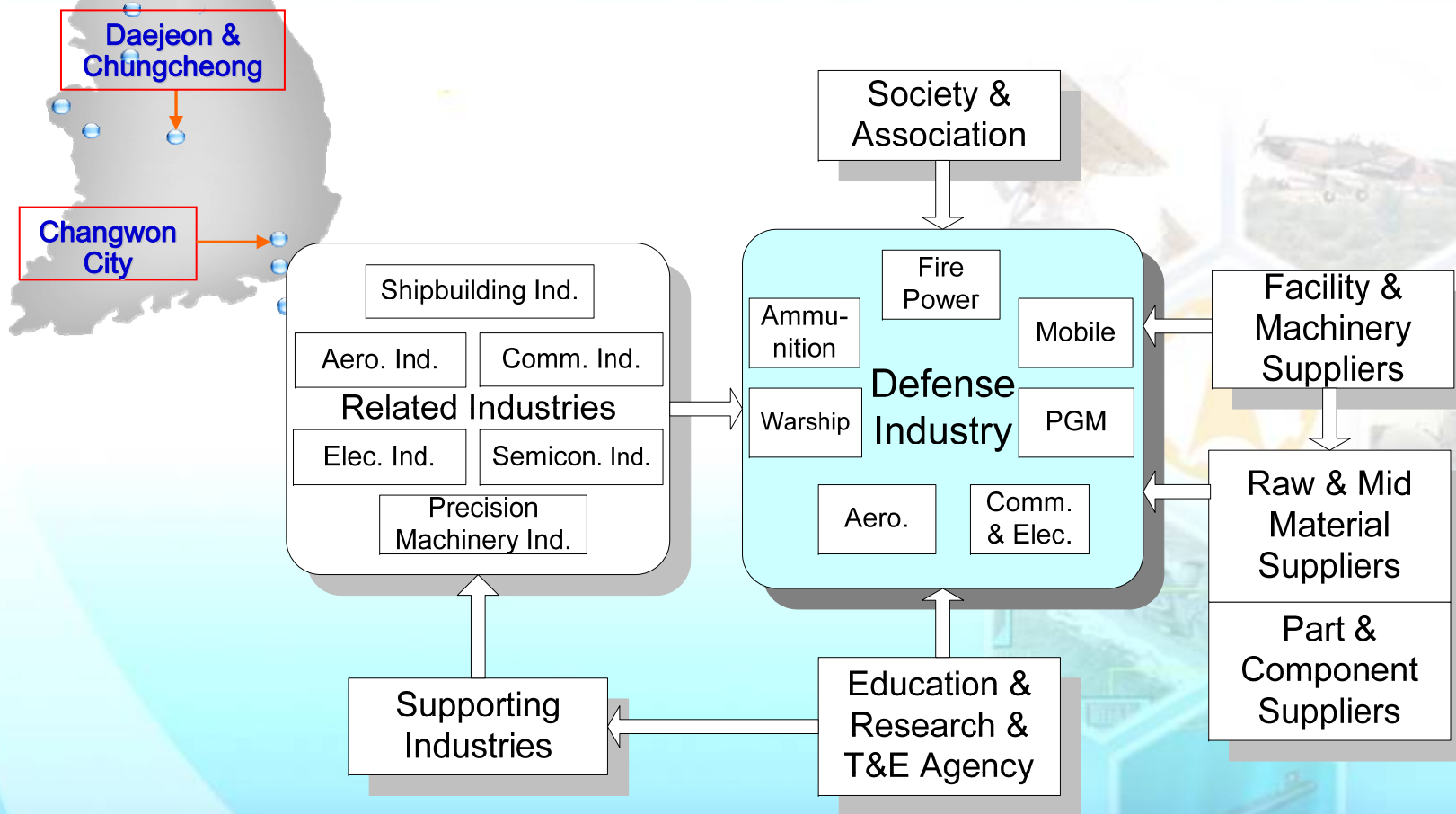


Figure 6. Defense Industrial Cluster for the Korean NDI in Changwon City

International Competitiveness Analysis of Korean NDI Using the P-D8F Model

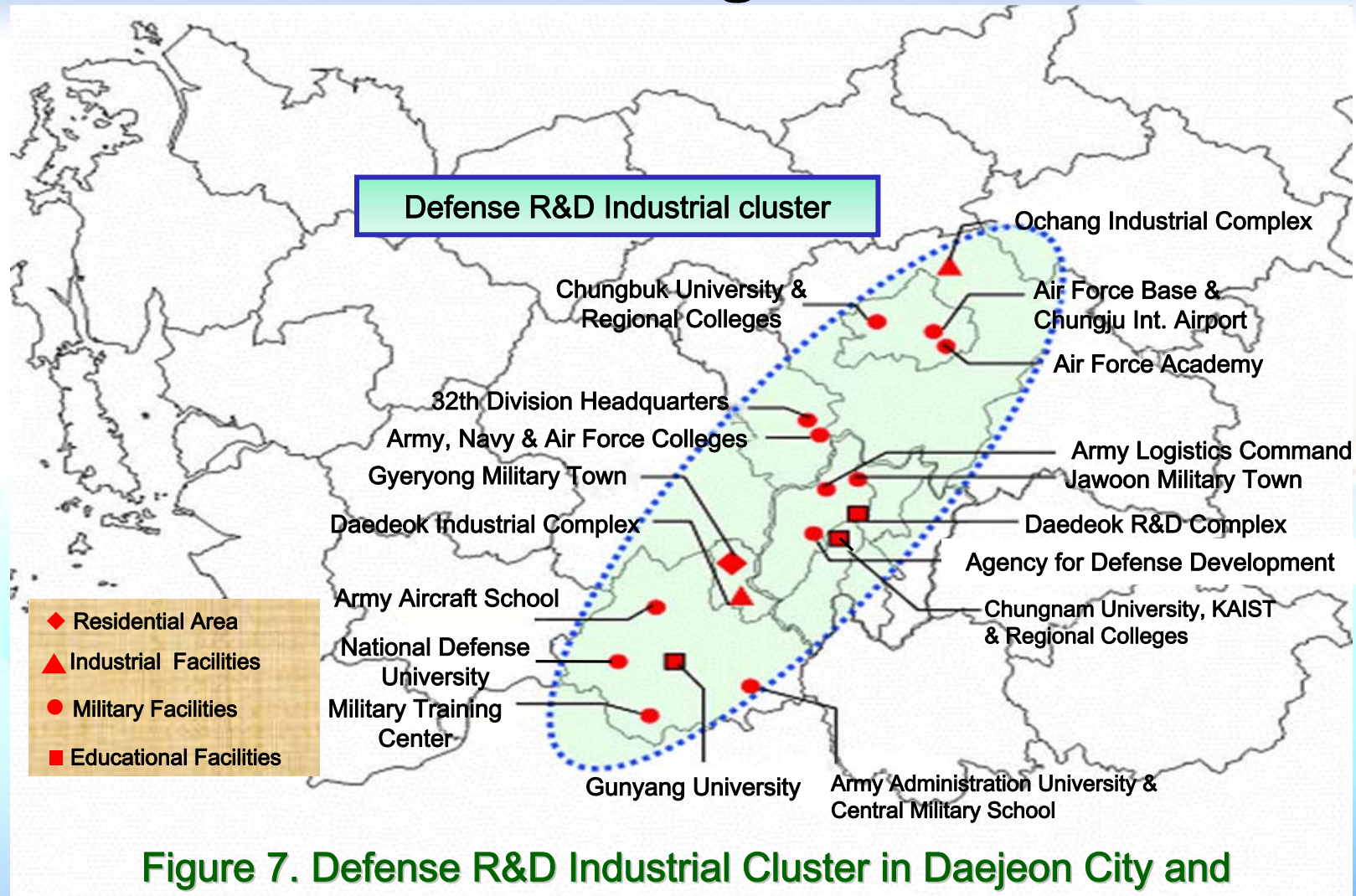


Figure 7. Defense R&D Industrial Cluster in Daejeon City and Chungcheong Province

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Chance

- Chances unexpectedly appear that have little to do with specific circumstances in a nation. They are important because they incur discontinuities that allow shifts in the competitive position.
- Korea is facing significant changes in its defense outlook.
 - Since the 2000 Joint Declaration, South Korea and North Korea have promised proactive exchanges and cooperation.
 - As a result of dramatic development in science and technology, the Korean defense companies have been subject to sweeping changes.
 - The technological cooperation of the Korean NDI with civil industries is underway.
- The oil shocks greatly reduce the defense budget in energy-dependent nations such as Korea, and downscale the size of the worldwide defense market. The US's Global War on Terror and the local wars in the Middle East Asia have shown the sudden increase in demand.

International Competitiveness Analysis of Korean NDI Using the P-D8F Model



Defense Policy and Relation (Foreign Government)

- During the post-Cold War period, developed countries have gained military superiority by protecting their national critical technological capabilities.
 - They have significantly increased their defense R&D budget to develop new technologies independently.
 - They have expanded the development of dual-use technology, a spin-on of civil technology and spin-off of military technology.
 - Most nations control and monitor the transfer of sensitive technologies and products to other nations while improving the export-control processes to promote and protect their domestic defense companies.
 - The restrictions of arms export and military technology transfer to competitive countries are much more reinforced.
- Korea has increased military expenditures to develop critical technologies independently, and has participated in cooperative programs with foreign advanced companies to introduce and co-develop advanced technology and to foster its arms exports.

Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

P&S1. Enlargement of Defense Budget

- Korea's defense budget in its GDP is still low compared to other countries. In 2006, the ratio of the defense budget to the GDP was just 2.6%, obviously quite low compared to other nations' ratio.
- The annual growth rate of Korea's defense budget is expected to increase up to about 9% through 2015, making the budget share out of GDP go up gradually to 3% in 2015 (MND, 2005). However, the budget share has to increase gradually up to the level of developed countries.
- R&D financial resources must be expanded in order to support the acquisition policy. The defense R&D budget has to increase to 10% of the defense budget to enhance the international competitiveness of the NDI in 2015 from just 4.7% in 2007.
- The dual-use technology programs are reinforced to share effectively the limited defense R&D budget with the civil sectors.

Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

P&S2. Reinforcement of Factor Conditions

- Korea must give the utmost priority to domestic R&D of Arms if it is to both enhance the critical technology capabilities of the NDI to the level of developed countries, and to raise the operating rate of the NDI to the level of civil industries.
- The NDI must participate more in R&D if it is to lead advanced arms development and to enlarge its technological capabilities.
- The ADD also has to be transformed into a core technology and system-of-systems-centric institute, and the NDI's role in developing general weapon systems has to be expanded.
- Due to insufficient expert manpower, the technical level of the NDI cannot be as good as other developed countries. To ensure comparative advantages over developed countries, more expert researchers and engineers are necessary.

Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

P&S3. Innovation of Defense Technology

- In the US, revolutionary innovations in military technology traditionally come from subcontractors or niche firms, and these firms frequently go on to dominate the markets. This paradigm has been observed frequently in many other industries as well.
- The ADD has to cooperate with academia, institutes, research centers, and industries, and to transfer acquired technologies and support them steadily to innovate defense technologies. If necessary, the government has to change the acquisition strategy to ensure a competition-driven innovation.
- The government must stimulate competitions through giving some incentives, and designate multiple sources to produce the desired technology. Probably the most important thing for improving and developing innovative technologies is to ensure robust funding.

Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

P&S4. Establishment of Competitive Environment

- The Specialization and Affiliation System has to be abolished to enhance the NDI's industrial competitiveness and to induce technological innovations.
- In order to promote technological development and efficiency, Korean decision-makers must prepare some criteria and processes to prevent excessive competition, and to institutionally ensure the entrances of small- and medium-sized companies.
- Reasonable designation and management of defense materiel and companies have to be established to promote competition efficiency.
- The government has to prevent inefficiency by reviewing requirements periodically, and must consider appropriate measures to designate and manage the defense materiel and companies for the competitive system.

Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

P&S5. Improvement of Management Condition

- The supporting funds to promote the competitiveness of the NDI have to be secured, and enough subsidies to develop critical technologies and construct infrastructures of the NDI have to be granted.
- The cost-based-contract system of defense materiel should be improved to enhance competitiveness for exports by reflecting more expenses.
- The government has to establish mid- and long-term strategies to reinforce the industrial base through regular investigation.
- The government also has to expand industrial stratum by fostering defense-specialized small and medium-sized business. Small and medium-sized defense firms have to participate in defense R&D.
- The government must establish technology-innovation support programs for the small and medium-sized defense firms.

Defense Acquisition Policy and Defense Industrial Base Reinforcement Strategy

P&S6. Reinforcement of Arms Export Sales

- The establishment of an improved export marketing strategy by the NDI is restricted because customers are foreign governments.
- The government-wide networks to support defense exports must be strengthened.
 - Potential and promising items have to be selected and developed to ensure competitive advantages over other countries.
 - The basis of cooperation among governments has to be strengthened by additional agreements.
- Operational support systems have to be established with trustworthy, importing countries, and measures have to be prepared to enhance price competitiveness - such as financial and tax support.
- Active cooperation with leading countries also has to be pursued aggressively in order to acquire their advanced systems and technologies.



Conclusions

- This study was conducted to investigate the international competitiveness of the Korean NDI.
- The characteristics and problems of various existing competitive models for other civil industries were reviewed and analyzed to develop a new optimized analysis model.
- The new analysis model, the Pentagon-Defense 8 Factors model, was derived to suggest the innovative strategy enhancing the international competitiveness of the Korean NDI.
- The international competitiveness of the Korean NDI was studied by applying the P-D8F model.
- A possible reinforcement strategy and defense acquisition policy to enhance the global competitiveness for the Korean NDI were suggested.



ADD Overview

- Mission
- History
- Organization
- Budget
- Facilities
- Laboratories
- R&D Achievements

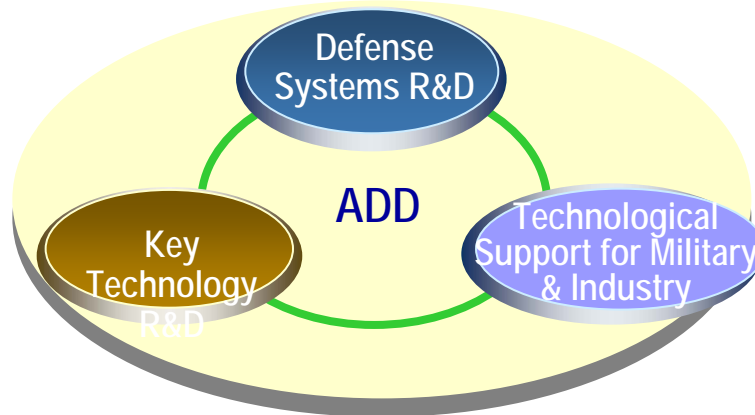




ADD Overview



Mission



Research, Development, Test and Evaluation of Weapons, Equipments and Related Technologies to Reinforce Defense Capability for Self-reliant National Defense



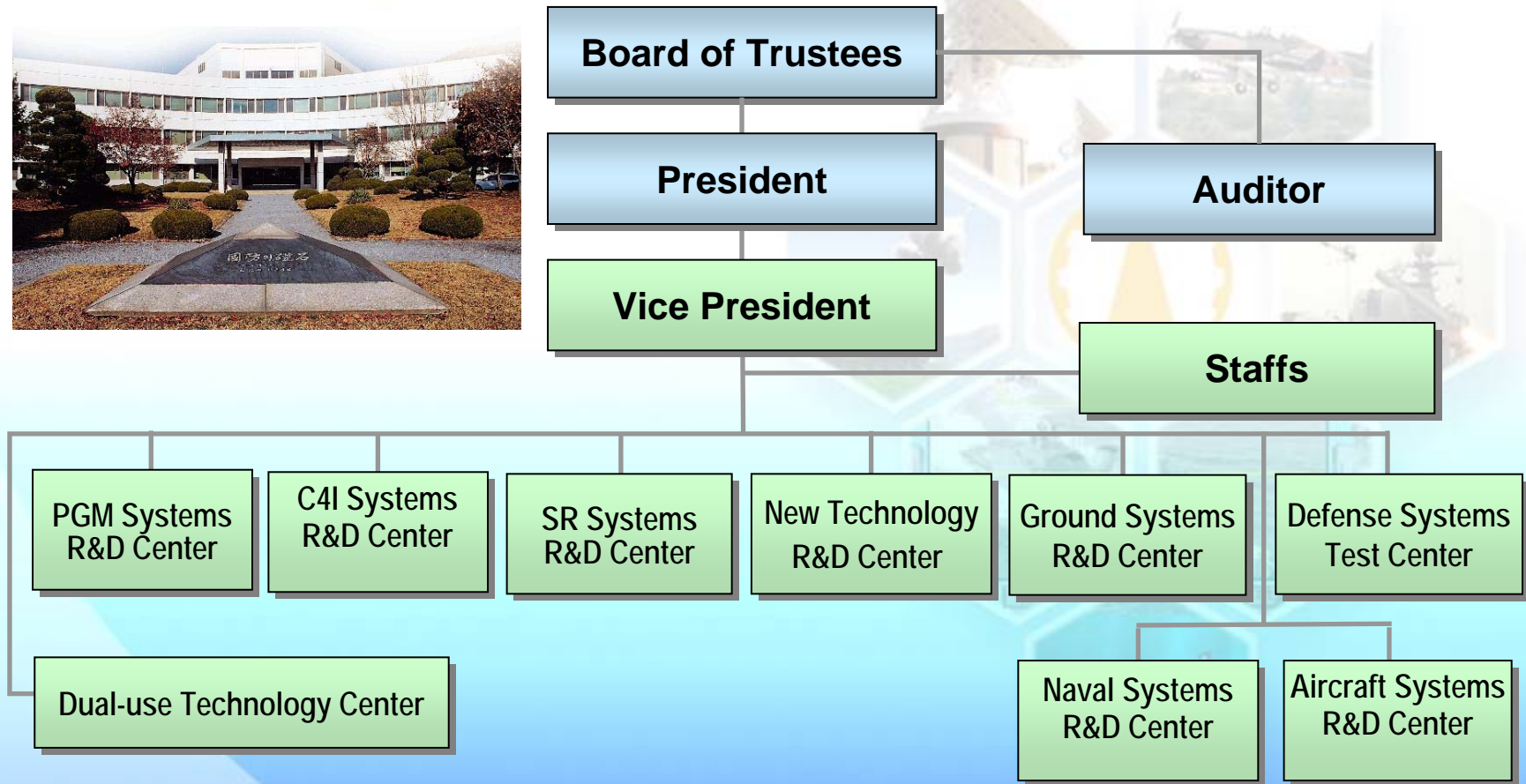
History

- 1970. 8. ADD Established
- 1970.12. Ground Weapon Systems Development Started
- 1974. 2. Missile Systems Development Started
- 1976. 5. Naval Weapon Systems Development Started
- 1983. 1. ADD HQ Moved to Daejeon
- 1988.11. Aircraft Development Started
- 2007. 7. Present Organization Activated





Organization





Budget

Classification	Number of Project	Budget (\$M)
MND R&D	90	606.1
• System	20	232.4
• Core Technology	68	371.5
• Technological Support	2	2.2
Government R&D	10	122.9
Infrastructure	-	94.6
Operation	-	195.8
Total	-	1,019.4

Man-power





Facilities

**Information
S/W R&D
Department**



Jeongok



**Artillery
Ammunition
Test Range**

Seoul

**Defense
Systems
Test Center**



Anheung

Daejeon

Haemi

**Aircraft
Test Center**



ADD HQ

Changwon



**Automotive
Proving
Ground**

Chinhae

**Naval Systems
R&D Center**



Geojedo



**Naval Weapon
Systems Test
Range**



Laboratories

Area	Major Laboratories (56)
Gun/Munition	Warhead, Munition Test 15
Maritime/Underwater	Underwater Acoustic Test 10
Missile	Guidance Control Test 21
Electronics/Optic	EMI/EMC Test 4
Aviation	Structure, W/Tunnel Test 6



Structure Strength Test



Wind Tunnel Test



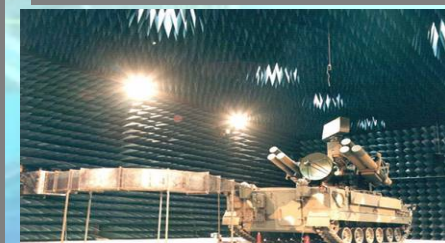
Warhead Test



Underwater Acoustic



Guidance Control Test



EMI/EMC Test



R&D Achievements

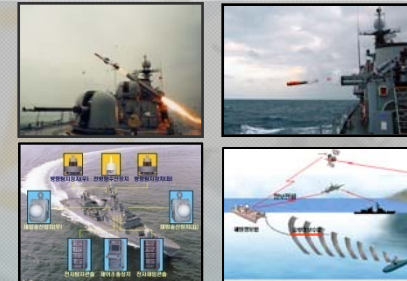
Ground

- 155mm Howitzer
- Armed Fighting Vehicle
- Tactical Comm. System
- MLRS
- Surface to Surface Missile
- Main Battle Tank
- Surface to Air Missile
- Guns and Munitions



Maritime

- Shipboard ESM
- Small Submarine
- Low Frequency TASS
- LPX/PKX/FFX Combat System
- Shipboard Surface Missile
- Heavy Torpedo
- Underwater Surv. System



Air

- UAV
- Airborne ESM Pod
- GPS Guided Bomb
- KT-1 Basic Trainer
- KA-1 Air Control A/C
- Airborne KOMSAR



Common

- Sat. Comm. System
- Navigation System
- C3I Command Post System
- Multifunction RADAR



Weapon Systems Development : 245 Deployed among 307 (80%)