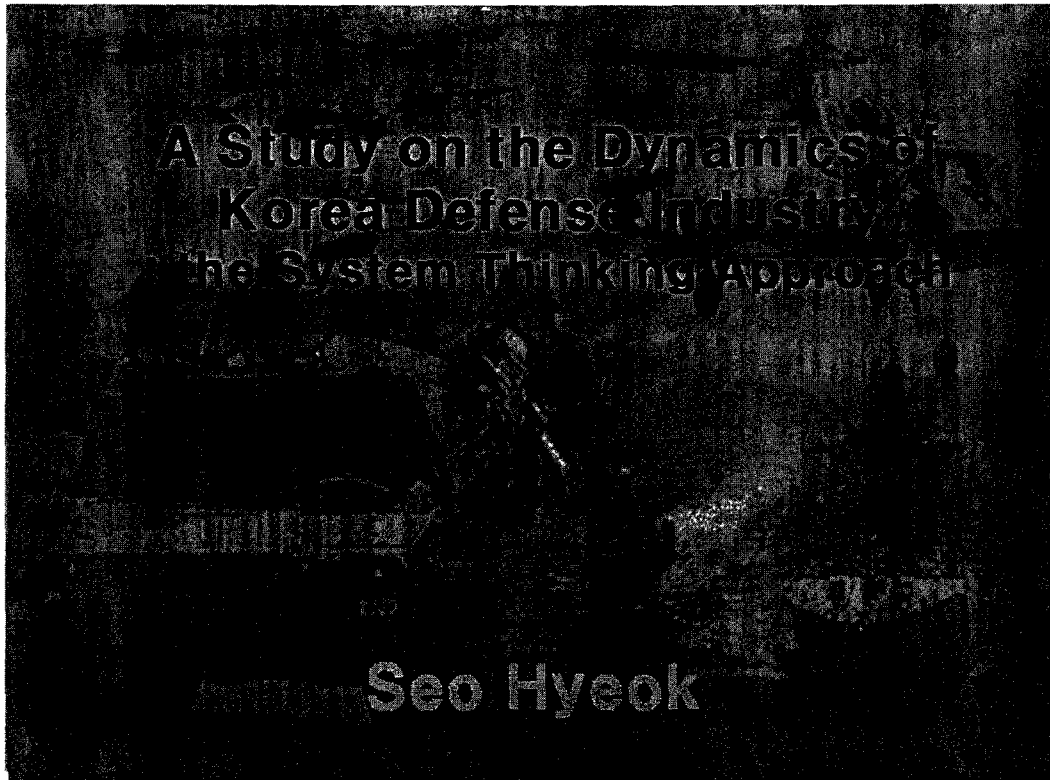


A Study on the Dynamics of
Korea Defense Industry
:The System Thinking Approach

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- Introduction
- A Trend of a Global Defense Industry
- Overview the Defense Industry of ROK
- Structural Problems of the Defense Industry in Korea
- Current Government's Policy & Prospect
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- SD Model of the Defense Industry
- Suggest Direction for Activation of Defense Industry
- Conclusion

Introduction

- Change of Global Security Environment : A System of a Collective Local Securities and Economies
- New War Paradigm : High-Technology Intelligence Science War
- energize their own countries Defense Industry
 - Secure their National Interest, Broaden a Base of Defense Industry, increase Defense Budget Increment
- The World is "Competition on the Balance"
 - ※ Coexist Peace and competition armament race

Introduction (Con't)

- Characteristic of Defense Industry of ROK
 - Present Paradigm : "The basis of Foreign Technology Import under Gov't Initiatives"
 - ※ As a result of that
 - falls short of securing up-to-date defense technology
 - Lack of Actual Technology Power & R&D Capability Comparison with Defense Industry Scale
- Main Focus & Significance
 - Drawing up Causal Loop Diagram on basis of System Thinking
 - Analyze each Loop, Insight Politic Key Driver & Suggest Physical Alternative Idea

Trend of Global Defense Industry

- Increasing the resources for weapon production & Defense R&D
 - Preparing for unspecified Threat
- Intensifying concentration through M&A among defense companies
 - USA : 60 defense companies → 6 major companies
- Raising up export volume of advanced countries
 - USA, UK, France : over 40% of Defense Industry Sale
- Strengthening the international cooperation and the globalization for defense industry

Overview of Defense Industry of ROK

- Main efforts of ROK military's force-improvement in incremental phase

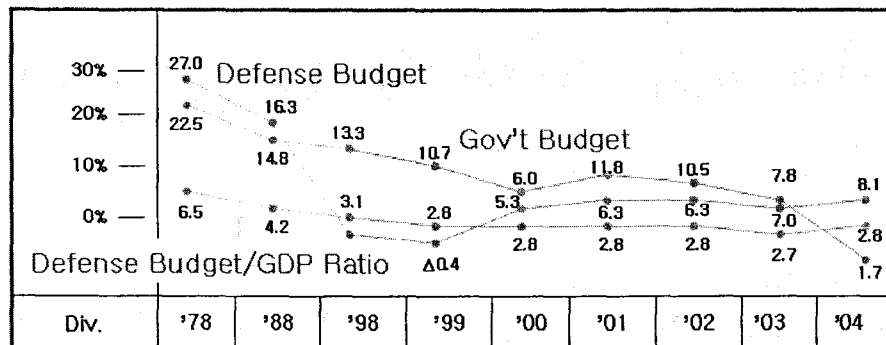
Phase 1 (1974~1981)	Securing the basic Defense Power * M-16 Rifle Production, High Speed Ship building, Old Equipment change
Phase 2 (1982~1986)	Reinforcing Defense Power * Production of Fighter by technology licensing (F-5) * Development of Field Artillery, Tank, and APC
Phase 3 (1987~1998)	Improving Defense Power / building up the offensive Combat Power * K-1 Tank, K-200 APC, UH-60 Helicopter * Production of Fighter by technology licensing (KF-16)
Phase 4 (1999~now)	Securing the High-Tech combat Power for present & future Threats * Submarine, Fighter, SPA, Destroyer, Guided Missile

Overview of D. I. of ROK(Con't)

- Early '70s
 - Attaining a Remarkable growth with Gov't's Support during short period
 - Domestic production of conventional Weapon
- '90s
 - Reduced Demand of Defense Industry of ROK
 - Advanced Country's Avoidance for High-Tech Transfer
 - Lowered Gov't's subsidies for Defense Industry
- Since 1997
 - Bankruptcy and under chapter of some defense companies
 - Most of Defense Industry Companies are faced with financial difficulties → Seeking various Solutions

Overview of D.I. of ROK(Con't)

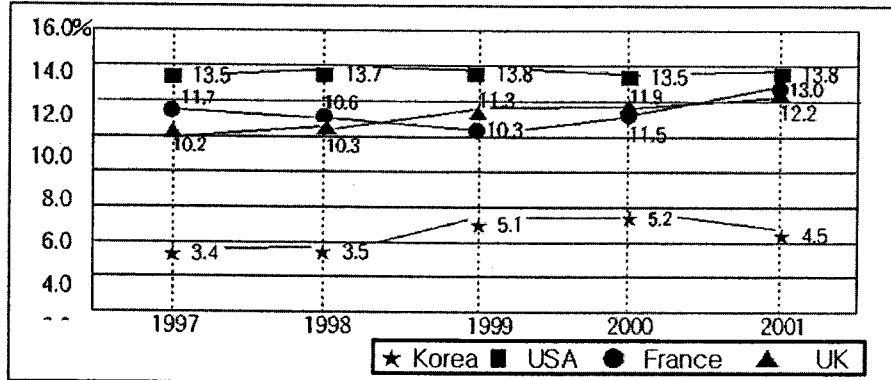
■ Yearly allocation of budgets



- * Increasing ratio of Defense Budget is halved against the one of Gov't Budget : about ½ (4.7%) vs Gov't (8.4%)
- * Increasing Ratio of DB vs GDP : '70(6%), '80(4%), '00(3%↓)

Overview of D.I. of ROK (Con't)

■ Comparison of national R&D Budget ratios



* During 1997~2001 : USA(13.6%), France(11.4%), UK(11.2%)
 → Korea (4.3%)

Structural Problems of D.I. in ROK

- Focusing on the short period of fielding the weapons : Keeping North Korea in mind
 - Imitation of fielded Equipment in Advanced Countries
 - Fragile Base of D.I Technology
 - Increased dependencies on Foreign Countries due to the policy of Technology license

■ Separated system between R&D and D.I.

ADD	Defense Industry Company
R&D of Weapon System	Production for Weapon ADD Developed

※ Lack of High-Tech, Insufficiency of R&D Capability

Structural Problems of D.I. of ROK (Con't)

- **Insufficient Technological Ability and Weakness of Firm Structure**
 - Lack of High-Tech Ability in Drawing the system & Developing Core Parts

- **Defense company's Limited autonomous management**
 - Growth under Gov't's control & Planning
 - Limited room of domestic demand
 - Low operation Rate & Tech. Level of D. I. Company

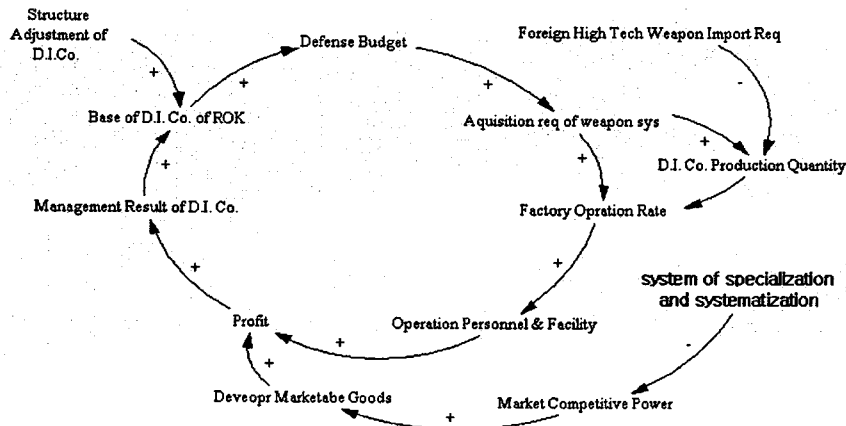
Structural Problems of D.I. of ROK (Con't)

- **Gov't's tight grip on the D.I. becomes a stumbling block for Defense Industry's Growth**
 - ※ Frequent Change of Mid-Term force-improvement Plan
 - D.I.'s Difficulty in Scheming Short-term Production Plan
 - Disconnection between R&D and Production Project

- **Nat'l Policy maker's insufficient Will on D.I. Growth**
 - Management's decreasing Interest because of the future Uncertainties
 - Lacking the governmental objectives of expanding the Defense Industry Growth
 - ※ Reduced Defense Budget & Importing foreign High Tech Weapon System → Impossible to perform High-Tech R&D

Structural Problems of D.I. of ROK (con't)

※ Causal Loop Diagram of an Article “Defense Industry Is Crumbling (Maegung)”



Current Gov't's Policy & Prospect for D.I.'s Activation

- Emphasizing more the importance of self-defense than the past Gov't
 - Increasing the defense budget ratio to 3.4% against GDP
- “The Policy Book of Defense R & D” Published
 - Self-Defense & Future-Oriented Defense Capability Construction
- Declared Defense transformation by Investing 600 trillion or more until 2020
- Created the DAPA which will take Full charge of Defense Acquisition Projects

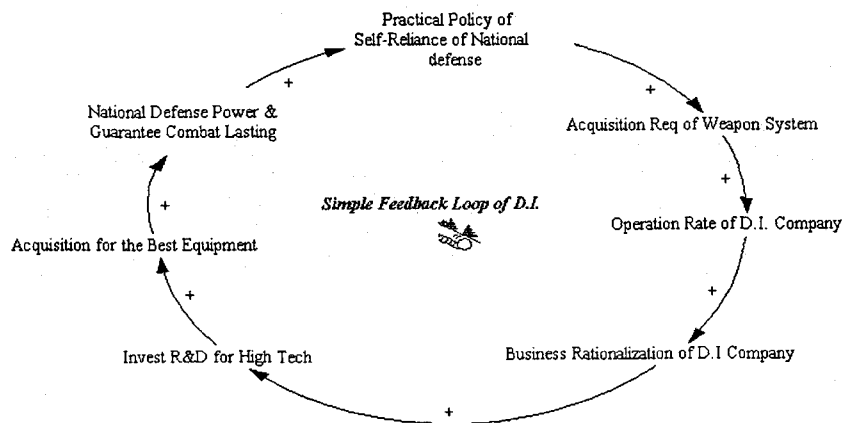
SD Model of Defense Industry

■ Setting up the Key Factors affecting Dynamics of the Defense Industry

- Practical Policy of National Self-defense
- Increased demand of Weapon System
- Operation Rate of Defense Company
- Transparent management of Defense Industry Company
- Investment for High Tech R&D
- Acquisition of the sophisticated military Equipments
- Development of National Defense Power and Sustainability of operation Capability in the battleground

SD Model of Defense Industry(Con't)

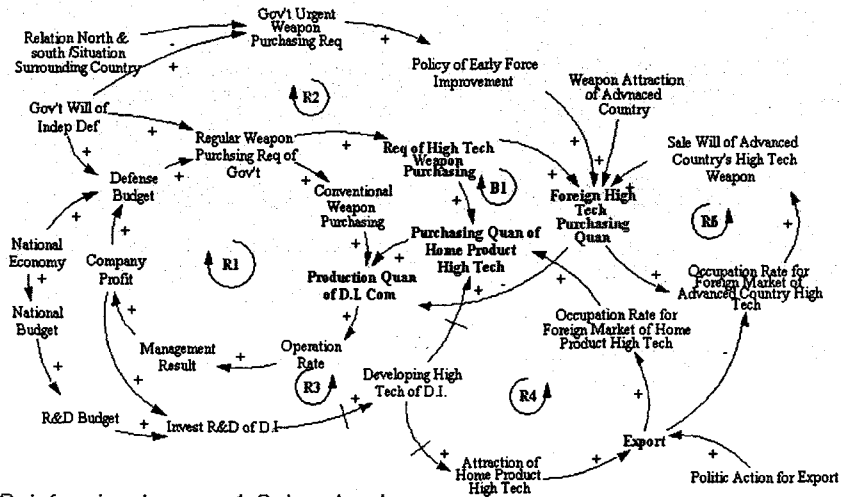
■ Simple Causal Loop Diagram between Key Factors



※ Limit to obtain Insight & Leverage. Need Additional Factors

SD Model of Defense Industry(Con't)

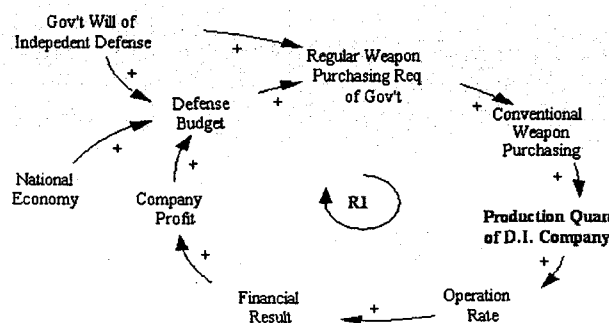
■ Practical & Detailed Causal Loop Diagram



※ 5 Reinforcing Loops, 1 Balancing Loop

SD Model of Defense Industry(Con't)

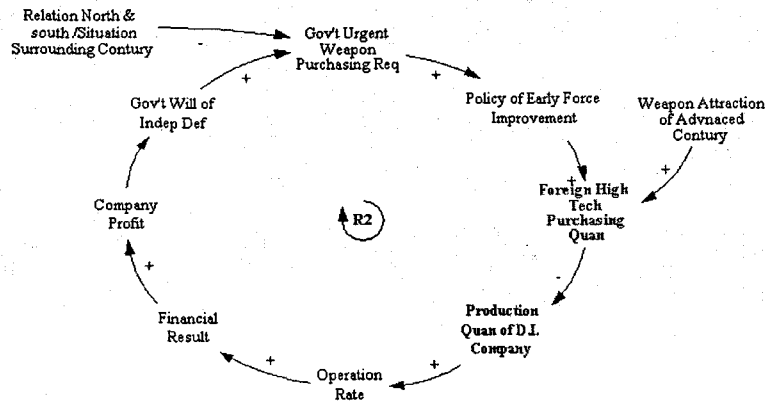
■ Loop of Requirement for Conventional Weapon Purchasing & Production (R1)



※ Reinforcing Loop : Create exponential Growth or Decline

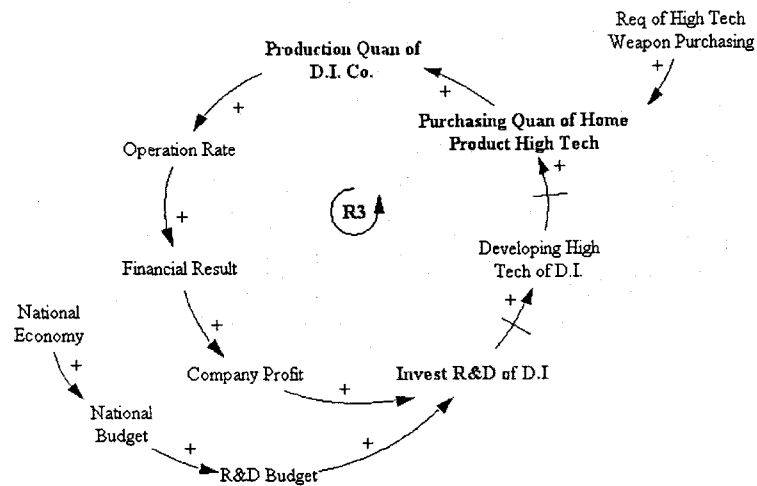
SD Model of Defense Industry(Con't)

- Loop of Foreign High Tech Weapon Purchasing due to the Early Force Improvement (R2)



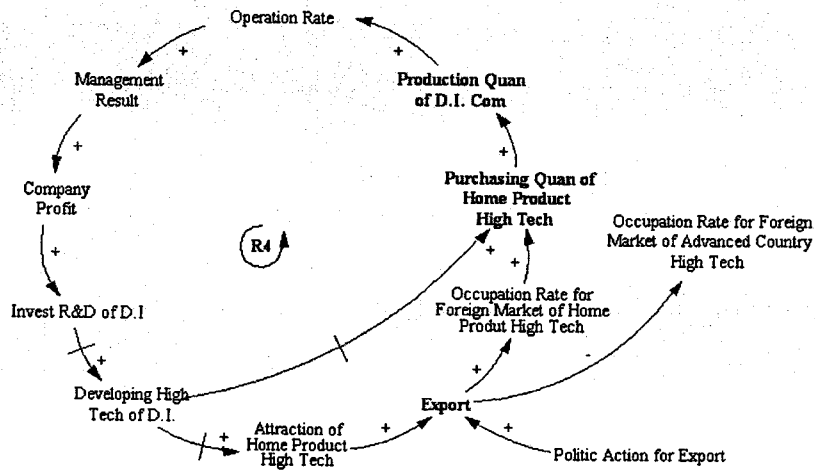
SD Model of Defense Industry(Con't)

- Activation Loop for R&D of D.I.(R3)



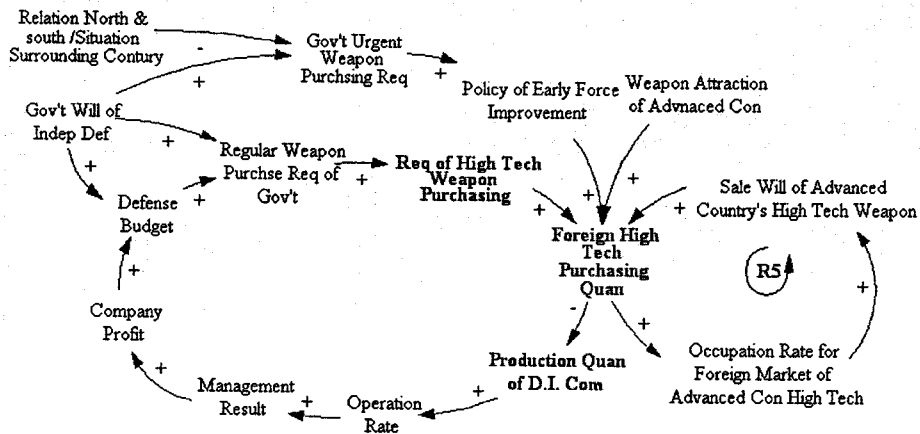
SD Model of Defense Industry(Con't)

■ Export Activation Loop of D.I. (R4)



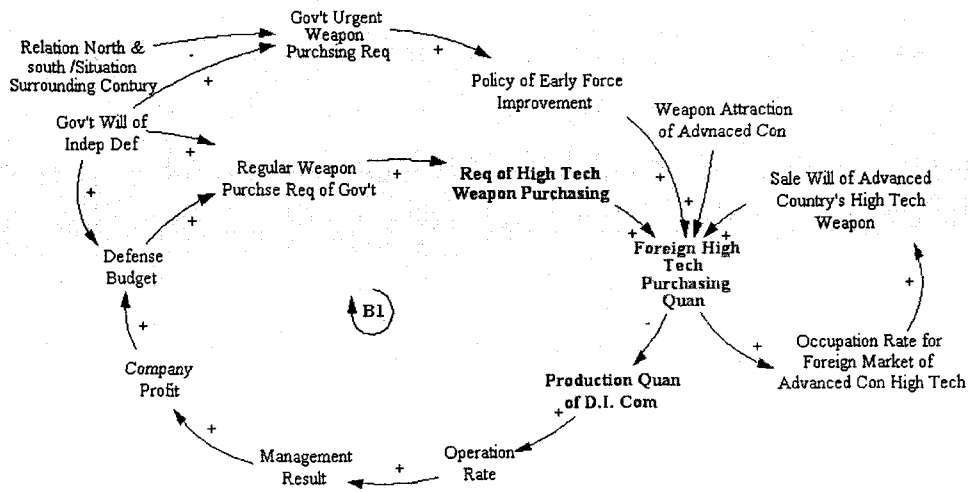
SD Model of Defense Industry(Con't)

■ Loop of Foreign Market Occupation of Advanced Country's High-Tech Weapon System(R5)



SD Model of Defense Industry(Con't)

Loop of Foreign High Tech Weapon Purchasing(B1)



SD Model of Defense Industry(Con't)

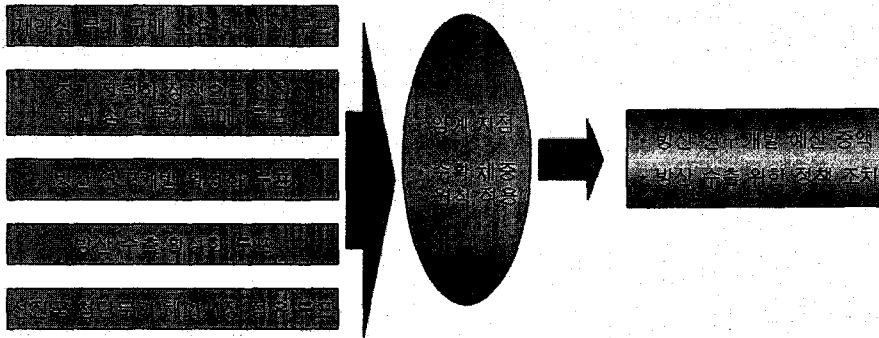
The Developing Direction of System Thinking

형태 연속적 유형 Continuous Patterns	구조 피드백 루프 Feedback Loops	전략 정책 지렛대 Policy Leverage
Goal seeking 수정	음의 피드백 루프 (Negative Feedback Loop)	▶ 목표수정 ▶ 병목지점 (Bottleneck)
지수적 증가, 감소 성장, 쇠퇴	양의 피드백 루프 (Feedback Loop)	▶ 임계지점 (Critical Mass) ▶ 수확채증, 구전효과
S-shaped: 성장한계, 용량제한	음의 피드백 루프 + 양의 피드백 루프 (Negative + Positive Feedback Loop)	▶ 용량제한 ▶ 회선용량
Oscillations: 과동, 불안정	음의 피드백 루프 + 시간지연 (Negative Feedback Loop + Time Delay)	▶ 완충장치 (Buffer Device) ▶ Timing management

SD Model of Defense Industry(Con't)

■ The Process for finding of Politic Leverage

자기 강화 부분

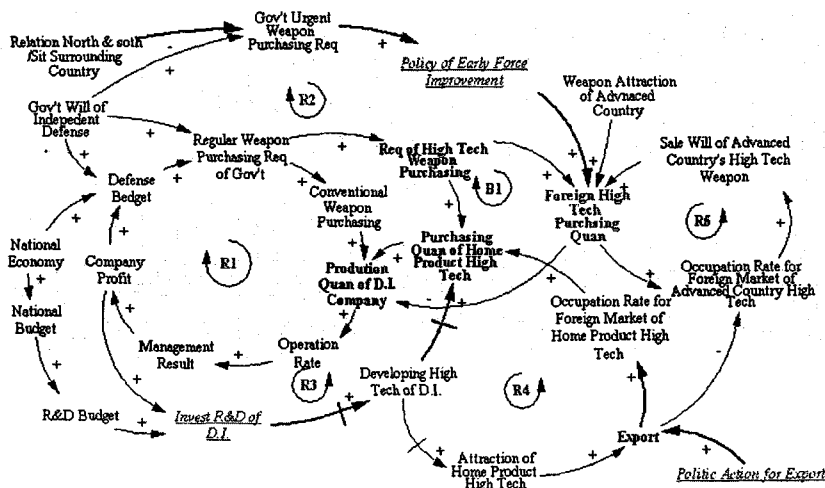


자기 균형 부분



SD Model of Defense Industry(Con't)

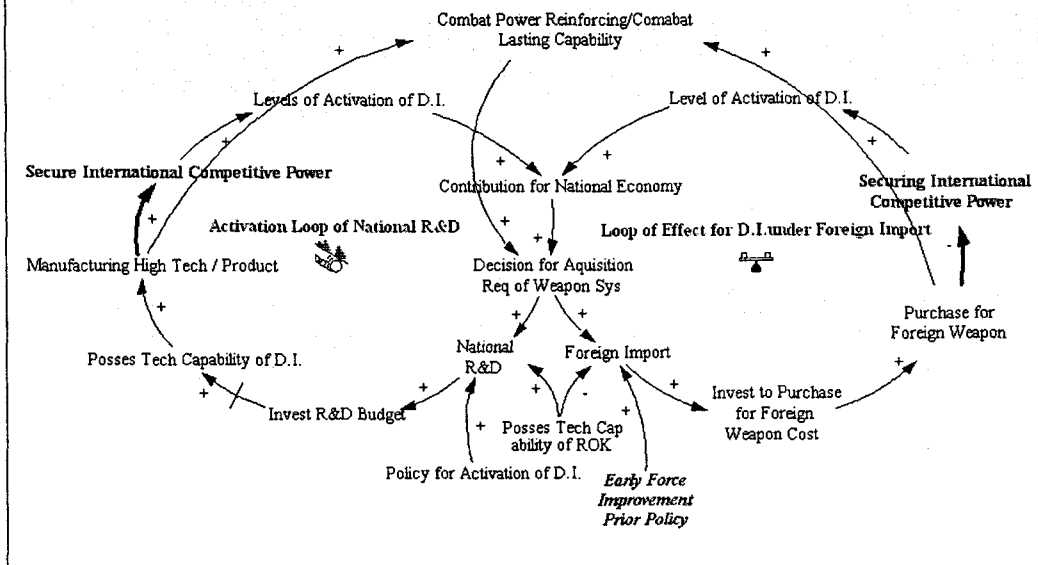
■ Politic Leverage for the D.I Activation



※ 3 Leverage : Change Policy of Early Force Improvement, Invest R&D of D.I, Politic Action for Export

Suggest Direction for Activation of D.I.

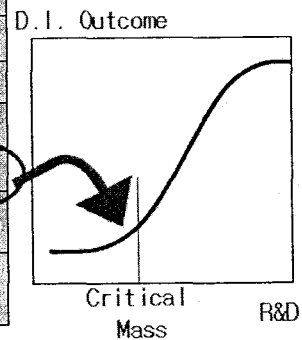
■ Constraints Early Force Improvement Policy



Suggest Direction for Activation of D.I.(Con't)

■ Increase Defense R&D Budget

		Mid Term Budget(draft)			
		'06	'07	'08	'09
Defense Budget		235,500	261,620	289,280	310,400
R & D	Total	11,628	14,971	19,125	21,388
	vs Def.Bud(%)	4.94	5.72	6.61	6.89
	Force improvement Budget	9,901	13,276	17,345	19,517
	Operation Man Budget	1,727.2	1,695.2	1,780.2	1,871.2

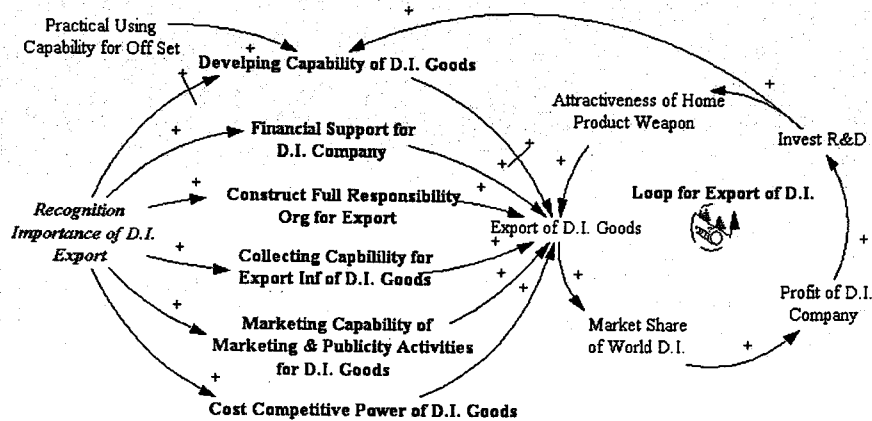


* Monthly Magazine "Defense & Technology" Vol.313, 2005

※ R&D budget near 7% comparison to defense budget
☞ critical mass

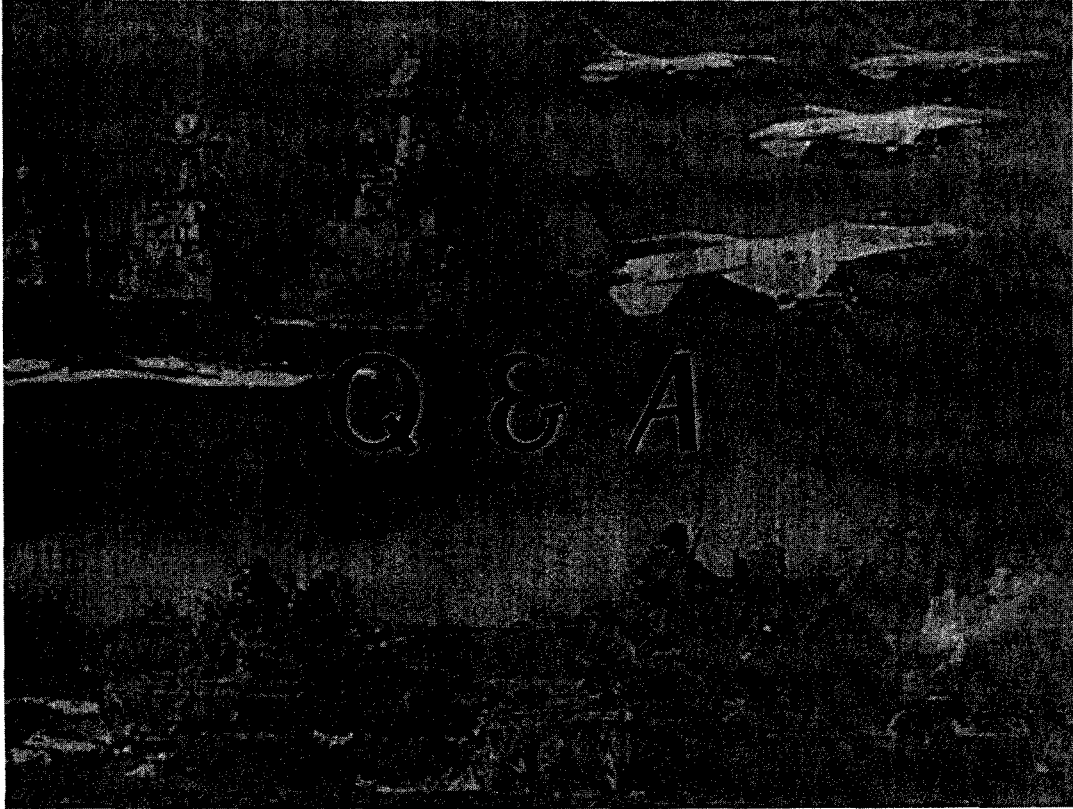
Suggest Direction for Activation of D.I.(Con't)

■ Politic Actions for Activation of Export



Conclusion

- Identified the Key Factors of Defense Industry
 - Setting the Relationship among the Factors
- Drew the Causal Loop Diagrams of Defense Industry
 - 5 self-reinforcing Loops, 1 self-balancing Loops
- Suggested the Policies for Developing the D.I. in Korea
 - Changing Early Force-Improvement Policy into right-time weapon-fielding
 - Allocating more resources on Defense R&D Budget
 - Administrative policies for expanding Defense Industry Export



-MEMO-