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Introduction

Prior efforts to negotiate denuclearization and inter-Korean conventional military arms control mostly occurred in separate tracks, involving different sets of actors and disparate topics without concrete linkages between them. Scholarly work on future negotiating roadmaps with North Korea similarly tend to address either nuclear/WMD or conventional restraint measures, but rarely the relationship between then. Yet, future negotiations over security on the Korean Peninsula invariably will confront a more complex deterrence environment. North Korea possesses an arsenal of nuclear weapons, arrayed on a variety of delivery devices that can target anywhere in South Korea, in East Asia, and the continental United States. South Korea is responding by arming with robust conventional missiles and missile defense systems that together enable a counterforce strategy, and possibly also damage limitation. The United States continues to extend nuclear deterrence to South Korea through their security alliance. Should leaders in all three countries seek a way out of what appears to be a growing arms race, their negotiators would have to address how the mounting asymmetric capabilities are now joined, to consider strategic nuclear weapons and related systems, including dual-capable missiles, and conventional military capabilities in parallel, if not together. Indeed, denuclearization is unlikely to be achievable without corresponding measures to address conventional military dynamics on the Korean Peninsula, and vice versa.

The tangled knot of intertwined but asymmetric capabilities among the three states makes it difficult, impossible short of regime change in North Korea, to achieve the denuclearization desired by Seoul and Washington and the regime security desired by Pyongyang without significant compromises. Convincing South Koreans to limit and rollback the missiles that deter North Korea by threat of denial and punishment if North Korea does not give up all its nuclear weapons will be hard. Convincing North Korean leaders to denuclearize while U.S. Force Korea and the U.S.-ROK alliance remain will be hard. Convincing U.S. officials to accept North Korea as a nuclear state in return for much lower chances of nuclear war will be hard. Ultimately, however, there may be no other path but a modus vivendi in which all three states accept these compromises in their positions.

If comprehensive negotiation were to occur to address the confluence of conventional and strategic capabilities on the Korean Peninsula, how could potential tradeoffs or offsets between strategic and conventional weapons restraints by North Korea be managed? What corresponding restraints would the United States and South Korea take? What logics or past experience might inform design of negotiations that attempts to address the linkage between nuclear and conventional capabilities? And what could be the political and security implications of attempting such a complex negotiation?

Pyongyang's acquisition of a nuclear arsenal and dual-capable missiles, Seoul's development of significant conventional missile strike capabilities, and U.S. extended nuclear deterrence and deployed military assets in Northeast Asia contribute to a complex deterrence situation on the Korean Peninsula. Efforts to address just one dimension of this situation are increasingly likely to run aground on the concerns of some parties about adversary capabilities in other domains. Recognizing that denuclearization is a longer-term objective, it could be more pragmatic to address current dangers through agreements designed first to dampen crisis escalation and arms racing pressures, leading incrementally but ultimately toward peace and denuclearization. Such negotiations would necessarily involve consideration – at least conceptually, if not practically – of how nuclear weapons and conventional military capabilities possessed by the various parties relate to each other. Achieving peace and denuclearization, and the simultaneous pursuit of both, would require finding means to tailor mutual deterrence and insulate stability across both nuclear and conventional military dynamics such that all parties – North and South Korea, the United States, and conceivably China – have incentives to sustain compliance and seek further accommodation.

This paper explores the role of linked arms control as a means to transition to a peaceful coexistence relationship with North Korea during the process of implementing denuclearization. The term "arms control" can trigger strong political reactions, not least because it implies some acceptance and recognition of North Korea as a state with nuclear weapons. Yet analytically it is the most appropriate concept for considering a negotiation that attempts to diminish the potential for conflict through reciprocal military constraints. In addition, the paper considers the feasibility of linking denuclearization to phased confidence-building and disarmament processes in ways that

do not impede or degrade allied deterrence posture against North Korea while it retains nuclear weapons.

Pursuing arms control with North Korea would require reciprocity, even if steps are not symmetrical. Realistically, removal of unilateral sanctions and other non-military compensatory measures are unlikely to yield deep and durable North Korean denuclearization steps, thus the need for reciprocal military constraints. If the United States and ROK were to utilize the arms control approach described here, it would be with the understanding that North Korean threat perceptions would have to be addressed, too, with implications for ROK and US military capabilities. If Seoul and Washington are not in principle willing to accept limitations on at least some military capabilities, then linkage along these lines is not feasible. However, should the governments conclude that diplomacy would be best served by some type of linked arms control involving constraints on strategic and conventional military capabilities, we hope this analysis can prove useful.

First, based on previous research, this paper will assess the achievements of past arms control agreements on the Korean Peninsula and offer lessons learned from European experience. Second, the current status of asymmetric weapon system development between North Korea and the ROK-U.S. alliance will be reviewed, and areas where we need to reduce the likelihood of accidental conflicts and increase transparency will be identified. Third, it will present an arms control concept applicable to the Korean Peninsula and the logic to guide negotiations when linking denuclearization and arms control. Finally, it will suggest policy considerations that need to be reviewed in order to maintain stability and further security cooperation between the ROK and the US.

Broadening the Arms Control Aperture

Before assessing the past and possible future of utilizing arms control to stabilize the Korean Peninsula, it is useful to define arms control and how this meaning is different than how other scholars have conceived of arms control on the Korean Peninsula.

Arms control is any form of cooperation that reduces the political and economic cost to prepare for war in peacetime, reduces the possibility of crisis escalation or war between potential adversaries, and reduces the extent of spread, damage, and destructive power in wartime.[1] This is a broader conception of arms control than is often assumed, since the term tends to evoke very specific ideas based on its practice during and at the end of the Cold War to wind down the US-Soviet nuclear arms race. In that practice, arms control was focused almost exclusively on reducing nuclear arsenals to equal limits, and with highly intrusive monitoring and verification provisions. In contrast, the definition of arms control utilized in this paper is not specific to nuclear weapons, contains no a priori assumptions of symmetry of restraints, and could involve a wide range of political and military measures that serve the objective of minimizing the potential for conflict.

Most scholars and experts in South Korea, building on mainly American Cold War literature concepts, tend to see arms control in conflict mitigation terms, even if they do not define it explicitly as such. They also focused exclusively on conventional arms control, rather than strategic arms control or the connections between the two. One foundational study suggests, for example, that arms control could be a means "to provide avenues for resolution of political and military disputes or prevention of miscalculations and misperceptions which could escalate into military conflict."[2] Accordingly, this literature tends to focus on measures that affect military posture and, ultimately, capabilities, but less on other types of confidence building or transparency measures. The focus on conflict mitigation is therefore channeled into operational and structural types of measures depending on how they regulate arms.[3] Operational arms control aims to reduce the risk of surprise attacks and the outbreak of war and to enhance transparency by controlling the deployment or operation of existing military forces and

1) Thomas C. Shelling and Morton H. Halperin, Strategy and Arms Control (Washington DC: Pergamon Brassey's, 1985.

2) Yong-sup Han, *Designing and Evaluating Conventional Arms Control Measures* (Santa Monica: Rand Corporation, 1993), p 4.

3) Paul K. Davis, "A Conceptual Framework for Operational Arms Control in Central Europe," RAND Research Brief-7802 (1989); Robert D. Blackwill and Stephen F. Larrabee, *Conventional Arms Control and East-West Security* (Durham: Duke University Press, 1989).

implementing mutual confirmation and monitoring measures. The size, structure, and weapon systems of the military forces remain the same, while training, maneuvering, operation, and deployment are controlled. Structural arms control, on the other hand, essentially means arms reduction. Such measures seek to diminish the size, number of units, and number of weapons possessed by the militaries, and to regulate the use, testing, and trade and development of weapon systems.[4] Whereas operational arms control measures are intended to improve predictability and reduce tensions, structural arms control seeks to insulate stability by reducing perceived threats that spur arms racing and limiting the potential destructiveness of conflict should it occur.

This traditional two-category view of arms control tends to oversimplify the full range of types, however, and creates conceptual confusion that is unhelpful in thinking about how to apply it in the future on the Korean Peninsula, in which strategic and conventional military capabilities are inextricably linked. For example, the definition of operational arms control aggregates three distinct concepts under one rubric: confidence-building, transparency, and operational constraint.[5] Confidence-building is pursued with the purpose of reducing military tensions, reducing the likelihood of unintended conflicts, and weakening the intention to use military force. Transparency measures can enhance confidence-building measures, but also are distinctly relevant to operational and structural arms control as a way to increase predictability in politico-military relations. Constraint measures impose restrictions on how military force is used. All three types of measures could encompass political and diplomatic means related to trust-building. Yet they function in very different ways, involving varying degrees of trust, cooperation, and intrusiveness.[6] Inter-Korean military agreements, including the 2018 agreement in Pyongyang, for example, reflect a range of "operational" measures without distinguishing between those that are political CBMs which we refer to as "behavioral" measures and those that are true operational military constraints.

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4) David V. Edwards, *Arms Control in International Politics* (London: Holt, Rinehart and Winston, 1969).

5) Richard E. Darilek and John Setear, *Arms Control Constraints for Conventional Forces in Europe* (Santa Monica: RAND, 1990).

6) Kang Choi, "International Arms Control and Inter-Korean Arms Control," *Journal of International Politics* 2, No. 2 (1997): 87-124.

Assessing Past Arms Control Attempts on the Korean Peninsula

There have been numerous attempts over the last three decades to negotiate and sustain both inter-Korean conventional arms control and multi-party nuclear restraint agreements with North Korea. Many of the agreements and processes that resulted from these negotiations reference denuclearization measures and establishment of a peace regime, clearly linking two disparate processes, both of which would necessitate conventional military restraints. However, in terms of actual implementation of constraints, rarely the twain did meet.

The foundational inter-Korean texts that address military issues and denuclearization were negotiated in 1991, specifically the "Agreement on Reconciliation, Nonaggression, Exchanges and Cooperation between the South and the North," and with the "Joint Declaration on the Denuclearization of the Korean Peninsula." Subsequently, in the 2000s, the participating countries of the Six-Party Talks acknowledged the need to discuss the establishment of a peace regime on the Korean Peninsula in parallel with addressing the North Korean nuclear issues. Article 4 of the 2005 Six Party Joint Statement and Article 6 of the February 13, 2007, Six Parties Agreement both stipulated negotiations on a permanent peace regime on the Korean Peninsula in an appropriate separate forum. In the "Declaration for the Development of Inter-Korean Relations and Peaceful Prosperity" adopted at the 2007 Inter-Korean Summit, which immediately followed the Six-Party Talks Agreement, the two Koreas expressed a shared view that the 1953 armistice system that ended the Korean War must be replaced by a permanent peace regime (Article 4). In the "Panmunjom Declaration for Peace, Prosperity and Reunification of the Korean Peninsula," adopted as a result of the inter-Korean summit in September 2018, the two Koreas agreed to actively seek the convening of three-party or four-party talks between South Korea, North Korea, the U.S. and China to build a stable and robust peace regime (Article 3). The July 2018 Singapore Summit joint statement between the U.S. and North Korea also noted a mutual desire to build a lasting and stable peace

regime on the Korean Peninsula (Article 2), in addition to pursing the "complete denuclearization of the Korean Peninsula." Therefore, the idea to address denuclearization and peace issues on the Korean Peninsula together has a long history, with the conventional military element remaining relatively undefined.

The primary reason that efforts to achieve progress toward a peace regime failed to mature is the persistence of fundamental differences in preferences between the two Koreas that stand in the way a direct approach, centered around the sequencing and content of arms control steps. First, the South Korean position has been that a peace agreement can be concluded and put into effect only when the North Korean nuclear threat is eliminated, i.e., denuclearization then peace. Second, South Koreans argue that it is difficult to discuss a peace treaty without first building confidence with North Korea that it will implement and sustain agreed measures, especially after punitive or coercive tools such as multilateral sanctions are relaxed. Accordingly, South Korea advanced a three-step arms control strategy that started with building confidence, followed by arms restrictions and eventually disarmament. However, North Korea's consistent position has been that U.S. Forces Korea (USFK) should first be disarmed, after which confidence can be built. The gap between each sides' positions was too great to be bridged. South Korean officials believed that the cause of persistently high military tension on the Korean Peninsula was the lack of trust between the two Koreas, and thus repeatedly proposed trust-building measures to enhance transparency, openness, and predictability in the military sector. North Korea rejected South Korea's "confidence-building first, then disarmament" proposal, arguing that disarmament, including the withdrawal of USFK from South Korea, must come first, and that confidence-building would follow naturally once disarmament is achieved.

Probably, North Korea's refusal to engage South Korean proposals to begin with trust-building steps stems in part from Pyongyang's desire to discuss military issues directly with the United States, rather than with South Korea. North Korea has insisted that "resolving the state of war between North Korea and the United States by changing the armistice agreement into a peace treaty is an urgent priority, and South Korea is not a signatory to the armistice agreement." This stance effectively precluded any linkage

between denuclearization and inter-Korean arms control negotiations. At the same time, there has been very little trust-building activity between the US and North Korea, which in turn hampers denuclearization negotiations. When North Korea did engage in limited trust-building with South Korea, it appears Pyongyang mainly viewed it as means to open a door for dialogue with the United States on nuclear issues. Hence, inter-Korean trust-building discussions rarely proceeded to the implementation phase.

A key factor behind these different preferences is a persistent divergence in how the two sides evaluate the military balance and its relationship to the scope of arms control. South Korea assesses the balance of military power by comparing the deployed capabilities of the allied forces against the combined capabilities of North Korea's nuclear and conventional forces. North Korea regards as threatening not only South Korea's military strength but also the US reinforcement capabilities based in the region, which could enable rapid force flow in case of an emergency on the Korean Peninsula.[7] This helps explain why North Korea focuses first on removing USFK from the equation, while South Korea emphasizes denuclearization first.

Largely because of these divergent views, on several occasions since the 1990s the two Koreas commenced negotiations to ease military tension and develop arms control steps, but with little success. Both South and North Korea regarded it as against their respective security policies to reduce their military forces in meaningful ways. Indeed, North Korea continued to develop nuclear weapons according to the military-first policy during the Kim Jong-il era, and the parallel development of nuclear weapons and the economy during in the Kim Jong-un era. Neither leader apparently viewed arms control as consistent with their policies. Yet senior North Korean officials, including Kim Jong Un, have spoken of the relevance of military balance to inter-Korean relations, suggesting implicitly the potential that a stable balance might be achieved and maintained.[8]

7) Kang Choi et al., "New Approaches to Arms Control on the Korean Peninsula," *Strategy Studies* 9, No. 2 (2002).

8) Robert Carlin, "North Korea: New Terminology Portends Ongoing Policy Shift," *38North*, October 5, 2021.

It is also the case that, compared to U.S.-North Korean and Six Party Talks denuclearization negotiations, arms control has not been a major agenda between the two Koreas through successive South Korean administrations. With the 1992 Inter-Korean Basic Agreement, the Roh Tae-woo administration agreed in principle to build trust in the military sector between the two Koreas; however, no specific follow-up steps were discussed. The Kim Young-sam administration took the position that it could not engage in dialogue with North Korea while Pyongyang was pursuing nuclear weapons. Since the North Korean nuclear issue was dealt with between the United States and North Korea, arms control talks between the two Koreas did not take place. North Korea continued to strengthen its nuclear capabilities during the Lee Myung-bak administration, despite the latter's efforts to address the North Korean nuclear issue. In its early days, the Park Geun-hye administration proposed a Korean Peninsula "trust politik," but North Korea's ongoing nuclear tests and provocations precluded progress. The Moon Jae-in administration scored a partial success with the conclusion of the Comprehensive Military Agreement during the September 2018 inter-Korean summit, though as discussed further below, implementation of many of the agreed measures has not been carried through.

During the negotiations noted above, when inter-Korean arms control issues were discussed, they were often subsumed under a broader framework aimed at creating conditions for various exchanges and economic cooperation. For example, while the United States and North Korea negotiated over nuclear issues, the Kim Dae-jung administration pursued economic projects and other types of cooperation with the North, effectively limiting the scope of discussion to measures to directly related to economic ties. There was no serious discussion about military confidence building and arms control between the two Koreas during that time. Though the Roh Moo-hyun administration held an inter-Korean general-level meeting in 2004 and reached agreement on "prevention of accidental clashes in the West Sea and cessation of propaganda activities," in practice its main success involved the construction of the Kaesong Industrial Complex and inter-Korean exchanges, not confidence building in the military sphere.

Notably missing from inter-Korean arms control discussions, as well as multilateral

nuclear negotiations, are issues pertaining to North Korea's other weapons of mass destruction programs. If the parties are to negotiate comprehensive threat reduction as part of a peace and security framework, North Korea's chemical and biological weapons, which pose a clear and demonstrated asymmetric threat to allied forces, would need to be included in the agenda and subjected to constraints and transparency alongside nuclear and conventional military capabilities. A key question that policymakers will need to evaluate is how to address biological and chemical weapons in future arms control talks – whether between the two Koreas or between North Korea and the United States. In any case, they should be prepared for the circumstance that inclusion of chemical and biological weapons in the arms control agenda could distract from the focus on nuclear and conventional military restraints, and elicit more demands for quid pro quos by Pyongyang that could more quickly draw down U.S. and South Korean leverage.

The September 2018 Comprehensive Military Agreement: A New Foundation?

Aiming to dramatically change the course of inter-Korean relations and correct for the lack of success of prior arms control efforts, the Moon Jae-in government invested significant energy during 2018 in negotiating a new military CBMs agreement. From the beginning of his term, President Moon aimed for "the issue of structural arms control, which controls the size of the armed forces and weapons system, to be discussed through the joint military committee agreed upon by the two Koreas so as to ensure substantial peace in accordance with progress in denuclearization and establishment of a peace regime on the Korean Peninsula."[9] The result was a landmark comprehensive military agreement signed on September 19, 2018, during the Pyongyang Summit. Under the agreement, the two Koreas established buffer zones to stop prevent acts on land, sea, and air, and completed the demilitarization of the Joint Security Area (JSA) in Panmunjom. Further, on a trial basis, 10 guard posts (GPs) on each side in the Demilitarized Zone (DMZ) were destroyed under joint supervision. In its scope and depth,

9) Blue House National Security Office, National Security Strategy, December 20, 2018.

the agreement seemed to break new ground for inter-Korean arms control.

But the confidence built through implementation of the agreement foundered as parallel U.S.-North Korea nuclear negotiations stalled in 2019. In June 2020, North Korea unilaterally cut off hot lines between the two Koreas and deployed multiple rocket launchers on Changrin Island near the Northern Limit Line in the West Sea, which violated the terms of the agreement. Subsequently, in an act that symbolized the destroying of trust and confidence, on June 16, 2020, North Korea exploded the joint military liaison office that had been established in Kaesong. Thus, even when the two Koreas can agree on rudimentary trust-building measures, political winds can inevitably shift in ways that stymie implementation.

Despite the lack of uniform implementation and inevitable backtracking, the September 2018 military agreement stands apart from past efforts for its aim to advance beyond initial trust-building—what we term behavioral arms control—to concrete steps to restrain military operations. For the first time, the two Koreas appear to share some concrete ideas about how to reduce the risks of accidental or inadvertent provocation and escalation, and mitigating sources of tension, such as fishing in disputed waters. Establishing a shared vision for how to use arms control to achieve mutually-agreed objectives is an important precedent.

In assessing the status of the agreement, some of the agreed measures were implemented quite quickly, and not simply because they comprised basic trust-building measures. Several of the first measures to be implemented constituted marked changes in military operations. For example, the two Koreas completed the withdrawal of troops and firearms from 20 frontline guard posts in the Demilitarized Zone within two months, as agreed on September 19, 2018. Earlier, on October 29, 2018, the United Nations Command verified the demilitarization work at the Joint Security Area in Panmunjom, including removal of weapons and reduction in security personnel. The two Koreas could jointly inspect on both sides of the contested border.

However, some other measures, such as the establishment of a joint military committee to continue high-level inter-Korean military talks, never started. This raises a critical question that the comprehensive military agreement does not really answer: is it possible

to set out an agreed arms control path, starting from confidence building to operational measures, and then structural steps. The fact that some inspection and verification of operational arms control steps per the military agreement could be done ahead of other behavioral measures seems to challenge the long-held belief that the order of arms control should start with political confidence-building, and that disarmament would begin only when sufficient trust is built over a long period of time. Instead, perhaps a mixed or parallel approach, rather than a fixed sequential one, may be possible.

Table 1. 2018 Inter-Korean military agreement implementation status

	Inter-Korean military agreement	Type	Progress
Completely cease all hostile acts against each other in every domain	Suspend artillery shooting training and outdoor maneuver training above the regiment level within 5 km of the Military Demarcation Line	Operational	Y
	Install covers on the port of coastal guns and close the gun gates and prohibit live-fire artillery drills and maritime maneuver training in agreed waters	Operational	P
	Discuss various relevant measures (cessation of reconnaissance, augmentation of force, etc.) to realize phased disarmament	Operational	N
Turn the areas around the NLL in the West Sea into a maritime peace zone	Establish a peace zone and a joint fishing zone in the West Sea	Operational	N
	Plan and develop measures for joint patrol to prevent illegal fishing within the joint fishing zone and to ensure safe fishing activities of the fishermen	Behavioral	N
Turn the DMZ into a peaceful area and begin recovery of war remains	Withdraw guard posts that are within 1km of each other and completely withdraw all guard posts within the DMZ	Operational	P
	Demilitarize the Panmunjom Joint Security Area and ensure mutual visits	Operational	P
	Jointly plan and excavate war remains within the DMZ	Behavioral	N
Establish a joint military committee and hot lines between military authorities	Continue to discuss the issue of installing and operating a direct line between the South and North Korean military authorities	Behavioral	N
	Discuss in detail issues related to the formation and operation of the North-South Military Joint Committee	Behavioral	N
	Jointly check and evaluate the implementation status of military agreements on a regular basis	Procedural	N

	Inter-Korean military agreement	Type	Progress
Militarily support cooperation, exchanges, visits and contacts at all levels	Discuss military security measures for joint use of the Han River estuary	Behavioral	N
	Develop measures for the connection and modernization of railway roads along the East and West coasts	Behavioral	N
	Discuss the use of direct routes to Haeju and passage through the Jeju Strait through the Joint Military Committee	Behavioral	N

Y: Implemented, N: Not Implemented, P: Partially Implemented

Lessons from Other Regions: Cold War Europe[10)]

There are relatively few examples from other regions that might help address questions about arms control sequencing, let alone the potential for linkage between conventional military and nuclear arms control. Although 1980s Europe is not perfectly analogous to 2020s Korean Peninsula, it is a useful – and really the only – example that demonstrates the feasibility of parallel strategic and conventional arms control. The experience offers some ideas on how it could be approached on the Korean Peninsula.

In Europe, as on the Korean Peninsula, there were clear relationships between nuclear and conventional weapons in deterrence practices of the United States and NATO on one side, and the Soviet Union and Warsaw Pact on the other. Extended nuclear deterrence provided by the United States through NATO is a comparable structure to the ROK-US alliance, in which it deters North Korean use of nuclear weapons, as well as North Korean conventional aggression under threat of nuclear escalation. Then, NATO conventional military capabilities were tied mostly to the Warsaw Pact conventional military threat, whereas today ROK conventional military capabilities, including increasingly robust and survivable punitive strike options, are tied to both North Korean nuclear and conventional capabilities. On the Korean Peninsula, North Korea has pursued nuclear weapons in part to offset its antiquated and under-resourced conventional military that is manpower heavy; the Warsaw Pact conventional military

10) Organization for Security and Cooperation in Europe, Helsinki Conference on Security and Cooperation in Europe Final Act, August 1, 1975.

threat was sufficiently robust that nuclear offsets were not as relevant. In Cold War Europe, negotiating phased arms control meant untangling these various knotted deterrence threads via a holistic, politico-military approach. Treating security as a system with multiple inputs helped to reduce potential for war, crisis escalation, and arms racing. Negotiators looking to build stability on the Korean Peninsula can find useful parallels and an obvious lesson, that attempting to isolate only nuclear or conventional deterrence could result in spillover or displaced arms race effects in other areas.

During the 1980s, US-Soviet nuclear talks and multi-party and intra-alliance negotiations among NATO and Warsaw Pact members on conventional military issues occurred in parallel. For many years, there was insufficient conjoining of interests and ideas about how to utilize the linkage between strategic and conventional arms control to reduce military tensions. Notably, the US position was that it could not entertain deep cuts in intermediate-range nuclear missiles in Europe without corresponding measures in conventional arms, either Soviet/Warsaw Pact reductions or European military modernization. European states worried that US-Soviet nuclear arms control would degrade deterrence of Soviet conventional threats. And the Soviet Union sought to preserve conventional military superiority while eliminating INF missiles.

Conventional arms control efforts in Europe gained impetus during the 1970s Helsinki process of East-West consultations aimed at reducing tensions. The 1975 Helsinki Final Act incorporated a number of security-related CBMs, such as declarations of major military exercises. However, subsequent efforts to deepen arms control through force reduction negotiations stalled for years over major divergence in concepts and security perceptions among NATO and Warsaw Pact countries. In parallel, beginning in 1968 with Strategic Arms Limitation Talks (SALT), U.S. and Soviet negotiators sought to control the strategic arms race and subsequently during the 1980s address burgeoning deployments of intermediate-range nuclear forces in Europe. There were no formal linkages between these two sets of negotiations. However, intra-alliance bargaining and politics for the US and NATO allies created informal linkages, particularly as they related to the credibility of U.S. extended nuclear deterrence commitments.

Revealing something of these linkages, then French Foreign Minister Jean-Bernard Raimond argued in 1986, for example, "A negotiation that would end in the total disappearance of American nuclear arms in Europe without also reducing the disequilibriums [with the Soviet Union] in conventional and chemical weapons would be dangerous for the security of our continent."[11] By the same token, the United States sought to leverage Soviet concerns that after INF missile elimination the US would "compensate" or offset the loss with conventional weapons increases. In a 1987 meeting, for example, US Secretary of State James Baker told Soviet Foreign Minister Eduard Shevardnadze that to avoid such compensation, "something would have to be done about the conventional imbalance in Europe. If it were impossible to negotiate a more balanced situation—and the experience of MBFR [Mutual Balanced Force Reduction negotiations] did not inspire confidence—then we would have to correct the balance."[12]

In 1986, political and economic changes then underway in the Soviet Union spurred adjustements in approach to both conventional and strategic negotiating tracks. The June 1986 Warsaw Pact "Budapest Appeal" recognized military asymmetry as source of danger and enumerated several proposals toward "lessening of the danger of a sudden attack" and promoting consolidation of "military-strategic stability on the European Continent." These proposals included initial military manpower reductions, followed by deeper reductions of 500,000 on each side; reductions in tactical strike aviation; restrictions in military exercises; and verification procedures. The document also called for reductions in nuclear-armed missiles with ranges up to 1,000 km. More importantly, the document signaled Warsaw Pact understanding of US and European positions and greater flexibility in dealing with the linkage between conventional and nuclear force asymmetries. After the Budapest appeal, diplomacy quickly blossomed. US President Ronald Reagan and Soviet Premier Mikhail Gorbachev met in Reykjavik the following October, and their negotiators hammered out details on the Intermediate-Range Nuclear Forces Treaty in time for Reagan and Gorbachev to sign it at a December 1987 summit

11) James M. Markham, "Parley on European Security Pact Starts in Vienna," *The New York Times*, November 5, 1986.

12) Department of State, Office of the Historian, Memorandum of Conversation, Moscow, October 22, 1987, available at https://history.state.gov/historicaldocuments/frus1981-88v06/d81 (accessed October 27, 2021).

in Washington. Meanwhile, the parties agreed to a new mandate for conventional arms control negotiations through the Conventional Forces in Europe (CFE) talks, which began formally in 1989 and concluded in 1990. The end result was separate and sequential negotiations and agreements, first on INF, then on CFE, but understanding of the linkage between them was a clear driving factor.

The negotiations that produced the INF and CFE treaties are very much a product of the evolving political, economic, and security conditions in Europe during the late 1980s, especially in the Soviet Union. It is also worth highlighting that it took 15 years of acrimonious and failed conventional arms control negotiations to get from the 1975 Helsinki Final Act to the 1990 CFE treaty. Yet, once negotiations concluded, the results constituted a remarkable achievement and helped usher in an era of improved security in Europe. The INF Treaty eliminated all U.S. and Soviet ballistic missiles with ranges between 500 to 5,500 km and instituted a system of on-site monitoring to verify non-production of such missiles. The United States and Soviet Union still retained other nuclear weapons and missiles with ranges below 500km and above 5,500km; for NATO states, the continuation of some U.S. nuclear deployments in Europe was seen as critical to credible extended nuclear deterrence. The CFE Treaty set equal combined intra-alliance limits in key categories of offensive arms, established force exclusion zones, instituted a verification system with transparency and on-site monitoring, and facilitated institutionalized CBMs.

In combination, the two treaties addressed a number of sources of uncertainty and tension that fed fears of crisis escalation, permitted reductions in military capabilities and budgets, and insulated broader efforts to establish peaceful relations among the states involved. Whether these treaties could have been reached without the political transformation under way in Eastern Europe and the Soviet Union is an interesting counterfactual. By the same token, it is impossible to evaluate the success of these treaties isolated from the massive changes that followed with the breakup of the Soviet Union. Nonetheless, in the view of one American expert involved in the negotiations, the treaties demonstrate the feasibility of arms control measures that “can effectively reduce the risk of surprise attack, miscalculation and error, crisis escalation, and pressure to preempt. This outcome is achieved through greater knowledge of the armed

forces and force activities of the potential adversary than is possible in a situation of tight adversarial secrecy about armed forces, and through establishing restrictions and limitations on the size, armaments, activities and deployments of armed forces whose violation gives early warning to the defender and whose existence requires the attacker to use valuable additional time after warning is given to prepare his forces for attack."[13] The same objectives could hold true in guiding efforts on the Korean Peninsula, even if the arms control approaches pursued and tools utilized address more the asymmetries among the parties rather than by establishing equal limits within defined geographic zones as was done through CFE.

The limits of the Cold War Europe analogy to the contemporary problems on the Korean Peninsula are clear. There are manifest structural differences: between power systems in Europe and Northeast Asia; alliance institutions and dynamics; geography and especially the lack of strategic depth on the Korean Peninsula; and comparative material and political circumstances of Soviet Union and North Korea, among others. It is also noteworthy that, more than three decades hence, neither CFE nor INF survived, so the longevity lessons are also relevant. In the Cold War case, the Soviet Union sought arms control to lock in reductions that they themselves had to make in any case for budgetary reasons. North Korea is not obviously in a similar position today. Similarly, diminishing Soviet leverage meant it would have to accept unequal limitations on Warsaw Pact capabilities. Again, North Korea does not appear to perceive itself to be in a situation of declining leverage. Therefore, if North Korea agrees to arms control, its rationale is likely to be rather different that of the Soviet Union and Warsaw Pact powers: as part of its effort to seek legitimacy as a state with nuclear weapons and leverage its capabilities for security and economic concessions.

Yet, presumably like North Korean leaders with the United States, Soviet officials saw arms control as a means to change relationships with European powers and the United States in order to enable trade and investment. North Korea today seeks to "remove the military manifestations of hostile policy towards it," an idea that would have sounded

13) Jonathan Dean, "Arms Control on the Korean Peninsula: How is the European Experience Applicable?" *Korean Journal of Defense Analysis* 3, No. 1 (1991), p. 81.

reasonable to Soviet leaders. Despite the differences in the two cases, the common motivations might make linked arms control as it was practiced at the end of the Cold War in Europe applicable on the Korean Peninsula.

How Might Linkage Address Past Implementation Failures?

The security environment on the Korean Peninsula today demonstrates clear linkages between nuclear weapons and conventional military issues. This is manifest in the ways in which North Korea combines threats of overwhelming punitive conventional attacks and nuclear strikes, and in the South Korean and U.S. approach to operationalize extended nuclear deterrence as an umbrella over combined conventional forces. Arguably, this linkage also appears in the increasing blurriness that specific military platforms are creating between the conventional and strategic domains, especially ballistic and cruise missiles, which can carry both nuclear and conventional payloads. It stands to reason that any negotiations to pursue denuclearization and conventional arms control should likewise address the connections between the two domains. Among the reasons that past conventional arms control negotiations on the Korean Peninsula mostly ended with partially implemented declaratory measures is that parallel denuclearization processes did not proceed apace, creating unsuitable conditions for inter-Korean negotiations on more concrete measures. Tighter linkage between nuclear and conventional arms control tracks could therefore enable and synchronize progress on both. Furthermore, it could also frustrate North Korean efforts to first use the inter-Korean track as a way to open the door to negotiations with Washington as a way to isolate Seoul. Of course, the danger that a blockage in one track could impede progress on the other would remain.

Furthermore, without a broad approach to negotiations through links between strategic and conventional capabilities, it is plausible that negotiations in one domain could spur offsets in others. This was already the case in the 1990s, as North Korea pursued development of long-range ballistic missiles during the Agreed Framework freeze of its plutonium program at Yongbyon. More recently, despite the implementation of many

of the September 2018 inter-Korean military measures, North Korea continued to expand its nuclear weapons and missile programs, and South Korea continued to augment its conventional military capabilities, including missile strike platforms. Therefore, a comprehensive and holistic approach to address all relevant sources of threat and perceived instability is less likely to result in dangerous offsets or to displace arms racing into other domains. This is an important argument in favor of including chemical and biological weapons in a future negotiation, despite the complications.

Assessing North Korea's security outlook and how Pyongyang might consider future parallel strategic and conventional arms control negotiations, it is plausible that North Korean leaders perceive a dilemma: given the role that both conventional and nuclear weapons play in its deterrence strategy, restraints introduced in one domain could make it more reliant on capabilities in the other. For example, an agreement to reduce arsenals of artillery and MRLS systems which are a key element of North Korea's conventional punitive threat against South Korea would mean North Korea would likely place a greater emphasis on nuclear weapons to deter ROK and U.S. military actions. Here, too, linkage between negotiations in the nuclear and conventional military domains could address the potential that deterrence could be disrupted in dangerous ways by arms control steps in just one domain.

Another related factor in considering a linked approach is the growing likelihood of an emergent stability-instability paradox on the Korean Peninsula. According to nuclear strategists, a stability-instability paradox can occur when two combatants enjoy a stable strategic deterrence relationship, which can paradoxically encourage risky and provocative conventional military behavior precisely because strategic deterrence dampens the potential for conflict escalation.[14] Thus, if negotiators only were able to constrain, not eliminate, North Korea's nuclear force without parallel restraints on conventional forces, the risks of lower level violence could grow since North Korean leaders would have less fear of retaliation.[15] As part of its conventional military

14) Glenn Snyder, "The Balance of Power and the Balance of Terror," in Paul Seabury (Ed.) *The Balance of Power* (Scranton: Chandler, 1965), pp. 185-201.

15) Benjamin S. Lambeth, "The Political Potential of Equivalence," *International Security* 2, no. 2 (1979), 33; Robert Jervis, "The Political Effects of Nuclear Weapons: A Comment," *International Security*

modernization, North Korea has been acquiring airborne weapons systems, hypersonic and electronic attack systems, intelligence, surveillance and reconnaissance (ISR) assets, unmanned combat weapons, and more. The combination of ISR capabilities and diversified strike capabilities that can evade U.S. and ROK missile defense systems would give North Korea more conventional options to leverage asymmetric advantages over the allied forces. Whether North Korea would be emboldened to take low-level actions to achieve political goals depends on whether the allied forces would be willing to respond aggressively at the risk of jeopardizing cooperation on nuclear arms control.

Linked negotiations could also address the main detractions for both North and South Korea to engage in arms control together. From North Korea's perspective, security guarantees offered by the United States are unreliable, which is a fundamental hurdle as Pyongyang seeks to diminish the U.S. threat of regime change via a changed relationship with Washington. North Korean leaders, concerned about a possible U.S. defection from an agreement, will hedge continue to hedge their bets between nuclear disarmament and reconstitution, making sustained denuclearization progress quite difficult. If nuclear steps were tied directly to corresponding steps on ROK-US conventional military capabilities, then North Korea have less incentive to hedge. South Korea, meanwhile, is growing its independent military capabilities to address North Korea's conventional military and nuclear threats, and Seoul will be hesitant to reduce its capabilities without corresponding changes in both domains by Pyongyang. So linkage could help build synergies that address the security dilemmas for the two Koreas.

Finally, linkage could help to mitigate the stresses on U.S.-ROK relations arising from parallel inter-Korean and U.S.-DPRK talks. The coordination challenges have proved difficult previously, which creates more opportunities for North Korea to make trouble. Realistically, negotiations that could adjust or regulate the military balance on the Korean Peninsula demands careful U.S.-ROK coordination. If such negotiations occur only in the inter-Korean or U.S.-DPRK tracks, each ally is likely to worry that its interests are being protected by the main negotiating party. Thus, a linked approach would require closer coordination between Seoul and Washington to align their negotiation

13, no. 2 (1988), p. 81.

positions. Although this could create friction when they hold different views or priorities, it at least would mitigate concerns about lack of transparency or decisions made by one ally that affect the other's interests.

A New Typology to Link Strategic and Conventional Military Constraints

With these premises, a future effort to link conventional military and strategic arms control on the Korean Peninsula would benefit from a conceptual approach that addresses political, including intra-alliance issues, and technical, military elements that are applicable to both conventional military and strategic domains. A simple dichotomy between operational and structural types of measures, as has often been applied in the past, is no longer sufficient for this purpose. A two-measure typology conflates various distinct types of measures and tends to preference technical, military-related measures over political ones, which are very clearly important to Pyongyang. Instead, a sharper articulation of how each type of measure operates, politically and technically, and what objectives it seeks to deliver, would aid negotiations. Historiography of arms control demonstrates that purely technocratic approaches to military restraints often failed, whereas successful ones knitted together both political and military steps.[16] Thus, clarity on how different types of measures – including their political and technical aspects – would apply in each domain is pre-requisite to successful implementation via linked negotiations. With this in mind, this paper suggests four types of arms control that could be utilized: behavioral, operational, procedural, and structural.

Behavioral arms control utilizes an array of tools – many to establish and regularize different types of communications – to build patterns of predictability into military and political relations, and to create expectations of certain modes of political and military behavior among participants. Behavioral measures may be prescriptive as the parties agree to do certain things, such as utilize a crisis hotline or notify of military exercises. Or it can be restrictive as the parties agree to not do certain things, such as issue military

16) Nancy Gallagher, *Arms Control: New Approaches to Theory and Policy* (London: Routledge, 1998).

threats. Such means of communications could include regular meetings among political and military officials, unilateral or joint declaratory statements, and creation of liaison functions. The behavioral type is probably most closely related to what is commonly understand as confidence-building measures.

Operational arms control aims to reduce uncertainty and tension and to mitigate fears of surprise attack and the associated crisis instability. Operational type measures could restrict the deployment, posturing, or exercising of existing military (or nuclear) forces. They may take such forms as force exclusion zones, limitations on exercises, or other constraints on posture and operations. Cooperative management of disputed territories or resources such as fisheries could also be considered a form of operational arms control that addresses specific political and/or economic tensions.

Procedural arms control is distinct from the behavioral and operational types, although it is often paired with them. It involves transparency or other provision of information about military capabilities or operations. Such transparency can insulate predictability in political and military relations and mitigate uncertainties and pressures that feed arms race dynamics. Procedural measures could comprise information exchanges including declarations of arsenals, visits and inspections, overflights, or other measures that provide opportunity to convey or affirm information. To be meaningful, procedural measures must involve information that is valuable to the adversary – what is often thought of as a "costly signal" – such that transfer of it fosters a better understanding of the other sides' capabilities.

Finally, structural arms control involves capacity, not merely operational, limitations on existing or future military capabilities. Such limitations – preferably reductions – lock in predictability, erase fears of surprise attack, and diminish the potential consequences of conflict should it break out. Reductions would also then increase the time and cost associated with re-armament. Structural measures could include caps and reductions in agreed categories of weapons, elimination of certain weapons, and proscription on development of specific military capabilities in the future. Any form of structural arms control will be more meaningful if accompanied by robust monitoring and compliance verification provisions.

As discussed below, different types of arms control could be linked in different ways to match the political and military needs of the negotiating parties. Which is not to say that implementing any of these types alone or in combination would be easy or without political or military risk. For example, behavioral measures can be relatively easy to agree, therefore also relatively low cost to not implement or to break out of. There is also a danger that behavioral measures become pro forma and lose meaning – as has happened with many of the security-related CBMs between India and Pakistan. Procedural transparency initiatives may in some instances prove more difficult to implement than other types for fear that information provided could be tantamount to handing over a "targeting list." Operational and structural measures, if not scoped well, could create paradoxical arms racing or other instabilities with non-proscribed weapons. In sum, proceeding with arms control beyond initial behavioral measures seems possible only after political and military trust has reached a sufficient level that these potential risks can be discussed and addressed in subsequent steps.

Negotiating with a Linked Approach

How might this new typology map to a strategy for linked strategic and conventional military negotiations with North Korea? The history of inter-Korean arms control and the example of the INF-CFE negotiations suggest several considerations. First, assuming that implementation would occur in phases, it is necessary to consider the logic and prerequisite steps that would underpin a progression from one phase to the next. That logic could be driven by combining similar or different types of arms control measures. Second, negotiators would want to minimize opportunities and incentives for hostage taking, i.e., seeking concessions in one track by blocking progress in the other. This may be partly a function of how the negotiations are designed, but it also clearly relates to the substance. Third, following from wanting to avoid blockages, negotiators would want to maintain momentum in both negotiations and, critically, implementation of agreed steps. Fourth, assuming a multi-party negotiation, there would need to be sufficient flexibility to address concerns of individual parties. And fifth, in keeping with the recognition that arms control is in many respects a tool to manage deterrence,

negotiations would want to avoid the potential for the development of offsetting capabilities or leaving some capabilities unchecked in ways that might spur new arms racing or increase escalation risks due to the stability-instability paradox.

With these considerations in mind, below we enumerate two plausible approaches for a linked negotiation: hard linkage and soft linkage.

The central premise of the hard linkage approach is that steps in each domain would be tied directly to like steps in the other. This would be similar to the "action for action" principle that motivated past nuclear negotiations with North Korea, but more narrowly defined, such that there would be, e.g., a phase of behavioral measures covering both strategic and conventional issues, or operational measures adopted reciprocally for strategic and conventional arms, and so forth. The hard linkage approach would therefore require agreement and implementation of a type of arms control in both domains prior to proceeding to a next phase. One variation of the hard linkage approach could also entail an attempt to sequence the types of measures in a strictly progressive way. For example, negotiators could in a first phase agree on behavioral measures covering both strategic and conventional issues, then operational, procedural, and finally structural. Given past DPRK refusal to adopt ROK ideas about trust-building as prerequisite, Pyongyang may not agree to a strict progressive approach, at least one that starts from behavioral steps, but it can still be illustrative.

In contrast to the hard linkage approach that would integrate steps within types of arms control, a soft linkage approach would pair different types of strategic and conventional military measures in more of a "mix and match" approach. The main difference between the hard and soft approaches is essentially how much separation there is between negotiations on strategic and conventional issues. In a soft approach, for example, a first phase agreement might pair an operational step in the conventional military realm with a procedural measure in the strategic realm. Thus, negotiations in the two domains might proceed with less coordination between them, though with a requirement for waypoints at which measures in the two domains would be joined into phases. In some ways, the soft approach might look and operate similar to past negotiating practice, with separate US-DPRK and inter-Korean tracks, and following

parallel roadmaps for strategic and conventional military issues. The main difference with past practice would be the requirement that strategic and conventional military negotiations proceed simultaneously, which would enable and bind progress in both domains and therefore mitigate hostage taking.

The table below lays out notional versions of how the hard and soft linkage approaches might work with some specific plausible measures in each category. These are not meant to be complete or comprehensive, rather illustrative for the purposes of analyzing how the linkage might work. In the hard linkage section, the measures are laid out in a progressive way, such that a first phase agreement would involve linked behavioral steps in both strategic and conventional military domains. The soft approach section consists of what is essentially a menu of options, and negotiators could match measures from the strategic and conventional military tracks to create a first phase agreement.

Table 2. Hard and Soft Linkage

		Behavioral	Operational	Procedural	Structural
Hard linkage – Symmetrical & Progressive	Conventional	1. ROK-DPRK military stability talks	2. artillery/MRLS limitation zone	3a. declaration of artillery pieces/locations within agreed limit 3b. transparency (overflights?) to confirm artillery exclusion	4a. Ceilings on artillery/MRLS systems 4.b Change in composition of USFK
	Strategic	1. US-DPRK nuclear stability talks	2. nuclear non-operational deployment agreement and cessation of military exercises involving nuclear forces (or dual-capable missiles) on the Korean Peninsula	3a. DPRK and ROK declarations of arsenals of dual-capable missiles with ranges up to 1550 km (?) 3b. transparency visits to ROK and DPRK missile operating bases (and US air or naval bases?)	4a. Ceilings on DPRK and ROK dual-capable missiles; 4b. Removal of THAAD
Soft linkage – Mixed Sequential	Conventional	New CBMs, e.g., monitoring of border agreements Establishing inter-Korean crisis management committee Non-aggression agreement	Artillery redeployments Offensive weapons (170/240mm Artillery) withdrawal No forward deployment of new weapons (e.g., KN-23) south of Pyongyang	Revitalization of Neutral Nations Supervisory Commission Notification of brigade-level military exercise	Disarming military facilities in the DMZ Ceiling on active serviceman (excluding the USFK) Ceiling on reserve and paramilitary units Freeze/reduction of rear area infiltration force No production of new weapons (e.g. KN23-25)

		Behavioral	Operational	Procedural	Structural
	Strategic	NFU and/or sole purpose declaration (w/o exceptions such as 'DPRK nuclear weapons use against allies of NWSs') Agreement on no nuclear/war threats. Negative security assurances.	Dual-capable missile de-mating and non-alert agreement (storing launchers, airframes, warheads separately)	Declarations, fissile material production freeze, and transparency at Yongbyon	Bio-chemical weapons elimination Destruction of strategic assets Dual-capable missile production freeze

Briefly, it is worth addressing two issues of nomenclature in the chart. First, we utilize the terms "conventional" and "strategic" to describe the two domains that would be subject to separate but linked negotiations. Conventional military capabilities are clear and obviously apply to both Koreas, as well as U.S. military capabilities deployed on the Korean Peninsula. The strategic domain is perhaps less obvious. Foremost, we use this term to encompass a broader range of capabilities than just North Korea's nuclear weapons, such as its chemical, and biological weapons. But it also would include ballistic and cruise missiles capable of delivering nuclear weapons. By expanding the category from nuclear to strategic, we bring in capabilities possessed not only by North Korea, but also some by South Korea.

This relates to the second choice, the use of the term "dual-capable missiles." Some North Korean missiles, like the Hwasong 15 ICBM, are clearly intended solely for nuclear weapons delivery and have no plausible use as a conventional military platform. Yet others, such as the KN23 SRBM, could carry either nuclear or conventional payloads, and it is plausible that during a negotiation North Korea would seek to retain these capabilities as conventional delivery systems. South Korea only possesses conventionally-armed ballistic and cruise missiles. However, some of these systems such as the Hyunmoo 4 SRBM can carry very large payloads, sufficient to deliver nuclear weapons if South Korea were to possess them in the future. More importantly, they also serve strategic purposes in deterring North Korea's use of nuclear weapons. Thus, by choosing terms that reflect the existence of some equivalence between the dual-capable missiles of both Koreas, it shapes the negotiating space in ways that comport better with reality and expand the trade space for negotiators. It also would give South Korea a more direct stake in negotiations on "strategic" issues since its own capabilities would be implicated.

Cross Domain Negotiating Challenges

The essence of a linked approach to negotiating arms control on the Korean Peninsula is creating durable and equivalent relationships between constraint

measures in the conventional military and strategic domains. Until now, from a negotiating approach, those issues have been treated almost wholly separately, in the inter-Korean track and various denuclearization talks, respectively. However, crossing domains in either the hard or soft linkage approach raises a few difficult issues, mainly of a political nature.

First, South Korea would necessarily be more involved in negotiations in the strategic track than ever before, especially in the hard linkage approach. Partly this involvement would be a matter of coordination of U.S. and South Korean negotiating positions, but also as a matter of capabilities. Now that South Korea possesses what are effectively dual-capable missiles, those systems may be implicated in operational, procedural, or structural measures negotiated in the strategic track. This could be a very political issue in South Korea, given the recent investment to build up the capabilities and their prominence in Seoul's deterrent strategy.

Second, just as South Korean capabilities might come into the strategic track, U.S. military capabilities deployed on or around the Korean Peninsula might be subject to negotiations in the conventional military track. North Korea has long called for the removal of U.S. forces and the dismantlement of the alliance, yet past inter-Korean military negotiations have largely avoided issues associated with the U.S. military presence. Pyongyang might seek removal of certain capabilities, reduction in forces, or other types of constraints. The politics of negotiations on U.S. military presence in the region could prove complicated in South Korea and in Japan.

Third, in terms of offsets and hostage-taking across domains, the incentives for attempting to de-link may be hard to resist for some parties. The hard linkage approach obviously constrains flexibility that negotiators might need to reach agreement. The soft approach yields greater flexibility, but at some risk that one or more parties could attempt to advance one track faster than the other in ways that could introduce new instability in the process. It is imaginable, for example, that North Korea would seek faster and deeper constraints on U.S. military forces in the conventional military track than it would be willing to give in the strategic

track. Such moves would effectively aim at de-linking certain issues from the process, thus subverting the basic premise of pursuing a negotiation based on linkage.

Compensatory Issues

Every agreement with North Korea to date, whether inter-Korean pacts, the Agreed Framework, or Six Party Talks, involved some form of compensation to North Korea for its agreement to undertake military or nuclear constraints. In some instances, compensation was included directly in the agreement, such as the provision of heavy fuel oil to North Korea under the Agreed Framework. In other instances, it came via quid pro quos separate from the agreement. Though outside the scope of this paper, any future negotiation with North Korea on conventional military or strategic restraints would presumably also involve multiple forms of compensation – whether sanctions relief, humanitarian relief, direct supply of energy resources, or others. North Korean statements alluding to "corresponding measures" make this expectation clear. How might such compensation comport with the linkage approach?

In the hard linkage approach, in which there would be like-for-like types of steps in each phase, associated compensation would be rewarding North Korea for both conventional and strategic restraints at the same time. Thus, compensation would not be necessarily tied just to strategic or conventional military measures. This could create some flexibility to negotiate different types of compensation at various phases. Yet, it also could give North Korea additional leverage to hold up progress if it demands forms of remuneration that are not feasible, or in Washington, at least politically salable.

In the soft linkage approach, compensation might be more closely tied to progress within each track, rather than to the whole package as in the hard linkage approach. Such separation of compensation could yield more balanced weighting of the perceived value of restraints in each track so the parties would not overpay for a particular strategic or conventional military restraint in a package. However, separation could also reduce flexibility for negotiators to pay "across" domains, for

instance South Korean compensation for a strategic measure. Thus, there is some greater risk in the soft linkage approach of North Korea attempting to play the ROK and US off each other, e.g., if it effectively blocks a step desired by South Korea by demanding a form of compensation it knows the United States is unable to provide.

Requirements for U.S.-ROK Coordination

In addition to the cross-domain and compensation issues, the hard and soft forms of linkage also carry implications for U.S.-ROK policy coordination. In the past, when there were very separate negotiations on conventional military issues in the inter-Korean track, and nuclear issues in multi-party formats, coordination between Seoul and Washington proved quite difficult. Both parties worried the other might make demands or concessions that would affect the other's interests. A particular neuralgia in Seoul is that Washington would agree to direct side-negotiations with Pyongyang without advanced notification or coordination.

A hard linkage negotiation could resolve some of the fears about poor coordination in Seoul and Washington given that both have capabilities that could be implicated in the strategic and conventional military domains. However, the demands for common U.S.-ROK positions on issues where there may be divergent views or interests could prove vexing to negotiators. For instance, South Korean officials may have specific views about the prioritization of steps in the strategic domain, which previously had been mainly between North Korea and the United States, that run contrary to priorities in Washington or Tokyo.

A soft linkage negotiation could provide greater flexibility to Washington and Seoul to pursue separate interests without the strong demands for common positions on all issues. But a negotiation involving separate tracks inherently raises thornier coordination challenges, and could also exacerbate alliance politics between Seoul and Washington if either party perceives the other isn't representing its interest in negotiations. The form of the negotiation – whether South Korea would be directly party to strategic negotiations, and U.S. to conventional military talks – would have

a significant impact on the extent of the coordination challenges.

Linked Arms Control and Military Balance on the Korean Peninsula

For the two Koreas and the United States, evaluating whether a soft or hard linkage approach to future negotiations might be worth pursuing will depend considerably on their perceptions and expectations about the military balance on the Korean Peninsula. At a broad level, the picture of the military balance on the Korean Peninsula is one of major conventional and nuclear asymmetries between the relevant powers. Developing a coherent and shared picture at a more granular level would take time and, probably, successful confidence building pre-requisites. Critically, how the ROK and U.S. perceive the military balance could be very different than DPRK or Chinese perceptions of balance, given differences and disparities in information collection and analysis of adversary capabilities. These perceptions and differences could easily carry into negotiations in ways that prove troublesome for attempting to agree on different types of arms control. For example, the precise number of dual-capable missiles possessed by North and South Korea, respectively, is not publicly known. If either Korea takes a position in negotiations based on over-estimations about the adversary's arsenal size, coming up with reciprocal steps that would not make either side feel too vulnerable would be very difficult.

In a low-trust environment, in which the parties will be acutely concerned that their opponents are cheating to preserve key military advantages, finding common ground regarding a stable balance of military capabilities will be essential. Unfortunately, there are relatively few common reference points on the military balance on the Korean Peninsula, especially given the relatively infrequent and episodic interactions by ROK and U.S. officials and military experts with North Korean counterparts, especially the KPA. The lack of trust and absence of a common heritage in arms control may also make it difficult to reach seemingly equal agreements that do not negate military advances, and to explain the results of agreements to concerned allies and publics. For example, when the 2018 inter-Korean military agreement

was announced, many experts raised concerns about some unequal steps and the absence of verification measures.[17] Notably, in the agreed West Sea buffer zone, North Korea provided 50 km and South Korea 85 km. Similarly, the inability to use reconnaissance aircraft to monitor North Korean forces in the no-fly zone was viewed as unfavorable to the US-South Korea alliance because ISR capabilities are key elements of the alliance's advantage and the North Korean military knows the operating hours of reconnaissance satellites and could hide military activities. The agreement also was silent on suspension of hostilities in cyberspace at a time when North Korea's cyber threats are growing and diversifying, which appears to be an asymmetric North Korean advantage. Clearly, the 2018 military agreement was not going to redress the major comparative advantages of each side, but it is imaginable that in a sustained negotiating process and with a spirit of compromise differences over preserving advantages could be narrowed. Ultimately, arms control is easier to negotiate in areas when both sides achieve some balance in their military capabilities, but realistically the situation on the Korean Peninsula will require careful management of asymmetries and avoiding disputes over demands for disproportionate constraints.[18]

Owing to information and perception gaps, a "bean-counting approach" to evaluating the military balance is likely to be of only modest utility. It is widely understood that North Korea maintains a larger standing military (1.28 million vs. 625,000 by one count)[19] and has quantitative advantages in certain categories of armament and equipment compared to South Korea. However, the qualitative picture at least as viewed in Seoul and Washington is assumed to be quite different, given concentrated ROK investments in military modernization, the added weight of alliance capabilities with the United States, as well as degradation, obsolescence, and poor resourcing in large segments of North Korea's military materiel. Thus,

17) Yonghan Park, "Assessment and Prospect of Inter-Korean Arms Control after 9/19 Agreement," *The Korean Journal of Area Studies* 38, No. 2 (2019); Toby Dalton, "A Challenge and an Opportunity in the Latest Inter-Korean Military Agreement," *War on the Rocks*, October 1, 2018.

18) Albert Carnesale & Richard N. Haass, *Superpower Arms Control: Setting the Record Straight* (Cambridge, MA: Ballinger Publishing Company, 1987), p. 330.

19) International Institute for Strategic Studies, *The Military Balance 2019* (London: IISS, 2019).

on paper there may be rough numerical parity, e.g., in the numbers of combat aircraft of the two Koreas, but there likely is a wide gulf in capability in specific areas. Evaluating military balance is complicated by ongoing modernization campaigns in both Koreas to replace outdated systems. These include, for example, new weapons system and the force improvement plan introduced by North Korea at the 8th party congress in 2021. Thus, it is not clear how North Korean military officials evaluate such differences in quality and quantity, and thus how it may inform their willingness to implement limitations or other arms control practices.

There are several facets of military balance that are germane to establishing a linked arms control relationship between conventional and strategic capabilities. One set of interesting categories – and the potential offense-defense relationship between them – relates to conventional strike platforms and South Korea's missile defenses. Presumably, North Korea will be wary to accept limits or reductions on its MRLS and ballistic missile programs, since both capabilities are highly relevant to the ability to exact punitive damage at a significant scale and therefore deter aggression. South Korea is also investing in a growing missile arsenal as well as layered missile defenses in number and diversity. To diminish the potential for surprise attack and mitigate crisis escalation, it is precisely these types of capabilities that would ultimately need to be covered under some type of arms control regime. There also is some evidence to indicate that Pyongyang perceives the efficacy of ROK and US missile defenses as a threat. North Korean military technologists seemingly factor missile defenses into their force planning, with many analysts linking it to the testing and possibly production of missiles such as the Hwasong 6/KN-04 that can maneuver to evade interceptors.[20] Thus, whether Pyongyang would link the continued presence of those defenses to its willingness to limit short-range ballistic missiles is an important question for negotiators; and for South Korea, whether it would be willing to give up some defensive capability in exchange for North Korean offensive constraints.

Though it may be less obvious in terms of linkage, the total size and composition

20) David S. Cloud, "US officials say new North Korean missile appears aimed at evading US defense," *Los Angeles Times*, May 15, 2019.

of military forces is another interesting category of military balance. North Korea's sizable advantage in armed forces also means that the defense sector skews North Korea's economy, such that Kim Jong Un may have incentives to shrink the size of the military to free up labor and resources for economic development. However, Pyongyang clearly ties its strength in numbers both to South Korean armed forces, but also U.S. forces as well. North Korea has argued consistently that U.S. troops stationed on the Korean Peninsula constitute a threat to the Kim regime. It also argues that since Article 60 of the the 1953 Armistice Agreement stipulates that all foreign troops shall be withdrawn from the Korean Peninsula, the removal of USFK constitutes a legal requirement for the achievement of a future peace agreement.[21] This is one category where disproportionate arms control steps, due to the size of North Korea forces, may be possible to settle with tradeoffs in other domains.

Another facet of military balance is asymmetric capabilities intended to off-set relative weaknesses. The tit-for-tat arms developments between the two Koreas, especially on conventional strike and air defense systems, shows how the search for off-sets can feed an arms race and affect the military balance. Some such capabilities could be relatively straight forward to factor into arms control negotiations. For example, North Korea has built a fleet of large and speedy naval vessels designed to quickly deliver assault troops to occupy South Korean border islands in case of war: a Surface Effect Ship with a central air-cushion system that can skim along the surface of the ocean and is believed to be equipped with a rocket launcher, torpedo tubes, and surface-to-air missiles which can be used for aggressive operations. North Korea also possesses Very Slender Vessels, which are much faster than air-cushion vehicles, capable of carrying Special Forces to infiltrate South Korean territory.[22] More difficult are capabilities that do not have obvious analogues in South Korea. For instance, North Korea is believed to have built a robust infrastructure to produce and weaponize some 20 biological and chemical agents, the latter including mustard, chlorine, sarin, and V-series nerve agents.[23] Of the

21) DPRK Commission of Jurists, White Paper, 2016.
22) "North Korea ready to launch high-speed VSVs," *Korea Times*, March 23, 2014.
23) Anthony H. Cordesman, *Weapons of Mass Destruction and the Global Nuclear Balance: A Quantitative and Arms Control analysis* (Washington D.C.: Center for Strategic and International Studies, 2002), 144-150.

biological weapons possessed by North Korea, anthrax poses a significant concern because of fatality and difficulty to detect infections at an early stage.[24] On cyber, North Korea itself is less vulnerable to attacks due to its limited internet capacity and low level of digitization, while it can exploit weakness in South Korea's defense of its vast digital infrastructure. These types of asymmetric capabilities may pose distinct challenges to arms control, yet if they are left outside the scope of negotiations it is possible that they could develop into a new conflict domain.

Although it likely would be exceedingly difficult to factor asymmetric capabilities into an assessment of military balance, there could be value in agreeing to certain principles, such as non-possession or non-use during peacetime. On chemical and biological weapons, for example, North Korea could agree not to possess them and to stipulate that it would, at an agreed time, declare and, in the presence of international observers, destroy any prohibited substances and/or pathogens. Eventually, North Korea would need to join the Chemical Weapons Convention and the Biological and Toxin Weapons Convention, make relevant declarations, and accommodate verification procedures—actions that could be sequences with implementation of the peace regime. Similarly, offensive cyber capabilities are too amorphous to count or even outright prohibit, yet clearly factor into a broader conception of military balance. Here too, for the purpose of avoiding surprise and limiting crisis escalation, agreeing to principles of non-use would make sense.

Turning then to the relationship of military balance to arms control, the challenge for negotiators will be to identify behaviors and capabilities that the parties believe should be subject to constraint at various phases. That is tied to perceived threats to the status quos, which contributes to fears of surprise attack, crisis escalation, or arms racing. In some instances, it may be that reciprocal and equal limits could apply, where in others the limits could be designed to permit some level of asymmetry in similar capabilities, or to create a relationship between different types of systems.[25] Proceeding with an arms control process that begins to manipulate and manage

24) The symptoms take from 1 day to more than two months to appear but spread throughout the body and cause severe illness and even death. CDC, Basic Information: Anthrax, available at https://www.cdc.gov/anthrax/basics/symptoms.html (accessed June 10, 2017).

25) Anthony H. Cordesman et al., *The Korean Military Balance* (Washington: Center for Strategic

military balance would not necessarily mean compromising national security or deterrence. Rather, the point throughout would for the parties to retain sufficient deterrence, particularly in early phases before parties have developed greater trust in each other not to seek gains by violating agreements.

Political and Security Implications of a Linked Approach

As we have noted throughout, the complexity of a negotiation that attempts to link conventional and strategic arms control on the Korean Peninsula may well discourage political leaders from attempting it. Other considerations also would affect how leaders evaluate the feasibility and political and security risks associated with this approach, including recent investments in major defense acquisitions, maintaining a sufficient deterrent capability, verification, and, of course, domestic politics.

Defense Modernization and Arms Racing

In Seoul, a major hurdle for any government to negotiate arms control will be its effect on South Korea's Defense Reform 2.0, an expansive initiative to restructure and modernize South Korea's defense. These reforms aim not only at increasing deterrence capabilities against North Korea's WMD threats, but also upgrading the capabilities to withstand future uncertainties in the security environment, including other threats from within the region. These investments in force improvement include a missile defense system, satellite surveillance, precision strike capabilities, and a cyber defense system. In September 2021, for example, the Agency for Defense Development tested four new missiles including a submarine-launched ballistic,

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and International Studies, 2011); Minseok Kim, *The State of the North Korean Military* (Washington: Carnegie Endowment for International Peace, 2020); James Hackett, *The conventional military balance on the Korean Peninsula* (London: International Institute for Strategic Studies, 2018); Yong-sup Han, *Designing and Evaluating Conventional Arms Control Measures* (Santa Monica: Rand Corporation, 1993); James C. Wendt, *US Conventional Arms Control for Korea: A Proposed Approach* (Santa Monica: Rand Corporation, 1993).

Hyunmoo-4 ballistic missile, long-range air-to-surface missile, and supersonic cruise missile. North Korea has been critical of the annual increase of 6.1 percent in Seoul's defense budget, and the projected average annual increase of 7.2 percent of the budget for force improvement programs under the 2021-2025 Mid-term Defense Plan.[26]

Further complicating matters, not all of Seoul's defense reform efforts are tied directly to threats from North Korea. For example, the cyber threat response system, combat drone system, reconnaissance aviation group and naval strategic maneuvering capabilities can be used for various purposes. Also, the Ministry of National Defense's efforts to apply the latest technology to high-tech weapons system such as artificial intelligence and internet-of-things is to build a more responsive command and control of forces against any source of threat, develop defense science and technology as part of the South Korean New Deal project, meet the conditions for the transfer of wartime operational control from Washington to Seoul, and support the defense industry.

It is not a coincidence that in parallel North Korea is pursuing more diverse and sophisticated means to deliver nuclear and conventional weapons. In September 2021, North Korea also demonstrated four new weapons system: a surface-to-air missile, a long-range cruise missile, a train-launched ballistic missile, and a purported hypersonic gliding weapon. Earlier, North Korea also revealed at large military parades other conventional military systems that are part of its modernization, especially longer-range multiple rocket launch systems. South Korean criticism of these developments was termed a "victim mentality" by Kim Jong Un.

In a speech to mark South Korea's Armed Forces Day on October 1, 2021, President Moon Jae-in argued that South Korea's plans to modernize and advance the defense capabilities can go hand-in-hand with improving inter-Korean relations. Yet South Korean leaders will be reticent to trade away these newly acquired capabilities as

26) Kyung-yoon Kim, "DPRK media criticized ROK defense budget increase," *YNA*, September 16, 2020.

part of an arms control regime. Like Seoul, Pyongyang is likely to see its modernized systems as integral to its security in the future, rather than as bargaining chips. Considering the huge sunk costs involved and two Koreas stances on military modernization, it is plausible that both will insist on retaining vital weapons systems, which will necessarily hamper the effectiveness of a potential arms control framework.

Defense and Deterrence Sufficiency

Another issue related to the ongoing modernization and perceptions of military balance is how the two Koreas determine a level of sufficiency in defense and deterrence capabilities. For South Koreans, sufficiency could be tied to capabilities to deter and deny North Korean gains from military provocations. For the ROK Army, deterrence by denial is important to limiting the potential scope of destruction from North Korean provocations and reducing the possibility of war by increasing the cost of armed conflict. For its part, North Korea may desire a sufficient punitive capability to deter potential efforts at regime change.

Ideally, the parties could isolate defensive and offensive systems and focus limitations on the latter to reduce threat levels. However, if some weapons systems are intended to deter by threat of punishment, it is difficult to define them solely as offensive systems. For example, South Korea's precision strike missiles are posited both as part of the counter-force "Kill Chain: program to interdict a North Korean nuclear attack, and for decapitation operations. If South Korea seeks to retain some of these capabilities for deterrence sufficiency purposes, North Korea would seek to maintain similar threats for its deterrence sufficiency. Early in an arms control process, these incentives are understandable – permissible hedging would be a necessary feature of an arms control framework. Yet, finding a balance between maintaining defense sufficiency and sustaining arms control would require thorny negotiations. In the abstract, it is possible to imagine various equilibriums of capability that would enable the two Koreas to have confidence in the sufficiency of their forces. But with little known about North Korean preferences, concrete ideas could only emerge once

negotiators are around a table.

Linkage and Verification Challenges

Disagreements over transparency and other means of verifying compliance with agreements have often been a source of disruption in past inter-Korean and multi-party nuclear negotiations. North Korean positions on inspection and verification have changed over time, depending on the scope of disclosure and the expected benefits from cooperation. For example, North Korea proactively offered several proposals for mutual inspections between the two Koreas during inter-Korean dialogues in the early 1990s. Presumably, mutual inspections were seen in Pyongyang as a net benefit for accessing not only South Korean military bases but also USFK bases. In response to North Korea's suggestion of a trilateral meeting among the two Koreas and the United States to discuss mutual inspections, South Korea insisted on equal inspections on both sides, subject to 24-hour advanced notice. Disagreement about the reciprocal inspections, especially on the proportionality of inspection sites, scope, and the time between advance notice and inspection, led to a stalemate at the inter-Korean Joint Nuclear Control Commission in 1993. In the past, North Korea also linked the issue of simultaneous inspections and verification to other issues, such as a legally binding non-aggression pact with the United States. North Korean opposition to U.S.-proposed sequencing of verification procedures was also at the heart of the breakdown of the 6-party talks process in 2009.

A framework that links conventional military and strategic capabilities brings in far larger numbers and types of sites that could be subject to inspection and verification activity – military bases, testing facilities, manufacturing plants, and research centers, among others. There would also be a far wider array of information that could be gleaned through monitoring and verification. It is difficult to make specific proposals for managing this complexity. However, a benefit of the linkage approach is that it formalizes opportunity for deal-making across domains and types of sites – e.g., a trade of U.S. and ROK inspections at a North Korean missile operating

base for North Korean inspections at a USFK base. If North Korea sticks to past positions demanding equal and impartial verification, then striking such deals would be difficult. That said, there may be opportunities to incentivize North Korean interest in verification that would be worth exploring, such as providing North Korea with more autonomous means to monitor developments in the region.

Domestic Politics

Presumably Kim Jong Un faces domestic politics of a particular variety that might influence how he would evaluate the feasibility of a comprehensive arms control negotiation. Rather than speculate on those politics, it is easier to point to the challenges accruing any leader in Seoul or Washington that would try to pursue the approach described here.

Conservative experts in South Korea accuse North Korea of raising tensions on the Korean Peninsula and introducing new weapons systems as a tactic to pressure Washington to negotiate arms control with Pyongyang, with the ultimate objective of pushing American forces off the Korean Peninsula and breaking up the ROK-U.S. alliance. Indeed, this is a plausible assessment of North Korean intentions based on available evidence. Therefore, some South Koreans are concerned that unless North Korea completely gives up its nuclear weapons, phased disarmament will result in a permanent nuclear-weapon status for North Korea, which they believe would cause great harm to South Korea's security. Referring to the history of North Korea's "deception strategy" of pretending to give up its nuclear development, they argue that arms control negotiations do not serve South Korea's national interest. Furthermore, advocates for South Korea's nuclear armament as one of the most effective countermeasures against North Korea's nuclear proliferation are becoming vocal. Navigating this political landscape would require the South Korean government to engage in a two-level game, by either appeasing, buying off, or otherwise countering the coalition among conservative politicians and scholars at the domestic level, thus maximizing its ability to satisfy domestic pressures, while minimizing the adverse domestic political consequences of an arms control

negotiation with North Korea.

Washington also has no shortage of North Korea hawks, who prefer to sustain sanctions over any type of negotiations, even though sanctions do not appear to have made North Korea any more likely to give up nuclear weapons. Any president that opts to engage in comprehensive arms control negotiations would have to address multiple criticisms – such as giving legitimacy to North Korea's nuclear possession, rewarding Pyongyang's bad behavior, harming U.S. security in Asia, and damaging U.S. credibility with allies. Attracting support in Congress for negotiations with North Korea is a particular challenge, especially to the extent that legislative action would be required to implement elements of an agreement, like withdrawing certain sanctions. However, the Clinton, Bush, and Trump administrations all made serious efforts to sustain negotiations with North Korea despite domestic criticism.

Next Steps

The analysis is meant to be illustrative, not a policy recommendation. Attempts to identify salient issues, analyze potential paths and options, look at some of the challenges and implications not complete but rather intended to spur further consideration and analysis by others. Future work to build on this could look at the incentives and ordered priorities of all three states, combine that with the arms control typology to produce a plausible roadmap. More analysis of stabilizing military balance with asymmetric capabilities should follow.

In terms of government-to-government cooperation, both the US and South Korea would benefit from working together to achieve an effective arms control mechanism through which each side can deepen their understanding about assessment of the security environment, priorities to achieve stability and promising areas where interests can align for common efforts. Success will take a lot of work and require broad-based cooperation between the two allies. Therefore, relevant departments and agencies between the US and South Korea need to coordinate closely on how to integrate this discussion into the existing consultation mechanism. The two allies

should have a regular high-level dialogue and information sharing regarding long-term plans on denuclearization and military confidence building measures to support phased nuclear and conventional arms control.

Securing supports from regional countries that are interested in the balance of power on the Korean Peninsula is indispensable to sustainable implementation of arms control measures. The two countries should work to strengthen public-private partnerships, utilizing Track II dialogue on regional security cooperation such as Council for Security Cooperation in the Asia Pacific and Northeast Asia Cooperation Dialogue to raise awareness of the merits of linked arms control as a means to manage cooperative relations with North Korea during the process of implementing denuclearization. By doing so, the allies can increase international support for the goals of reducing threats, preventing conflict, establishing a crisis management system, and laying the groundwork for peaceful regime on the Korean Peninsula.

II

The Analysis and Implication of Israel's Defense Industry Policy

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Chapter 1. Introduction

A country's arms production and transfers are considered not only simply economic aspect, but also very important domestic and international security factor. In general, the lately developing countries want to have defense industry due to these strategic and economic motives. The security strategic motives are self-sufficiency of defense materials, dealing with external threats in terms of security, reducing the security uncertainty, stable supply of defense materials, etc. The economic motives are import arms substitution, industrialization through the defense industry development, Job creation and technology transfer, and improving the current account through exports, etc.

The defense industry is a future-oriented and high technology industry with great effects and impact on national security as well as extremely high technologies integrated industry requiring large scale investments.

In addition to the U.S., countries adjacent to South East China Sea, the Middle East, and Eastern Europe, which are scattered internationally with various conflicts and tensions, are expanding their military expenditure spending to buy next generation weapons systems in order to have future military advantage, to survive in competition through change and innovation. In 2018, the global defense expenditure is estimated to be around $1.82 trillion.

Most of all countries around the world are making efforts to prepare future war by national defense industry development policies such as emphasizing R & D of weapons systems, increasing international defense goods cooperation and exports, and strengthening the competitiveness of defense industry companies. Korea has also implemented defense industry policies in order to promote national competitiveness and establish an economic foundation for the integrated connection between military power construction and the defense industry.

But unfortunately Korea still has continued arms trade deficit for a long time due to the absence of a domestic defense industry structure and a clear export industrialization policy. If the current domestic defense industry structure will be

continued, contribution to the national economy by defense industry can not achieved, and fundamental limitations will be suffered. 〈Table 1-1〉 shows that Korea defense industry has a lot of problems

Table 1-1. Problems in the domestic defense industry

1	Lack of technology and lack of self-sufficiency
2	Absence of export industrialization policy
3	The absence of specific action plans at the national strategic level
4	Stuck to high-cost and low-efficiency industries
5	The government's excessive regulatory policy
6	Advanced technology countries mimicking industrialization strategy

As such, problems such as the government regulatory policy to the defense industry, weak defense industry base, domestic market dependence, lack of technology and competitiveness, and inefficiency budget spending are still continued in Korea defense goods market. In order to solve these problems and make a better defense industry, the purpose of this study is to find out implications by analyzing Israel's defense industry strategy.

Chapter 2. The Characteristics of Korea Defense Industry

Section 1. The general characteristics of the defense industry

The defense industry usually has the following characteristics.

First, the defense industry is a capital intensive industry based on huge capital investment. Expensive defense equipment, as well as the enormous cost of productions continues to rise. Moreover, new weapons with improved performance are much more expensive than older weapons. The typical actual average production cost per unit trends of Defense equipment produced in U.S. such as aircraft, helicopters, missiles, warships, submarines has doubled by 10% in 7.25 years.

Second, The impact to the national economy is very large. With the government

budget, Defense spending is used for the national security goods produced in addition to the effect that contribute to effective economic and social development at the same time. It provides employment opportunities, sensible, and the number of professional soldiers, makes roads, ports, runways, including the formation of social overhead capital, and supports citizen and contributes to the society.

Third, it takes a long time to prepare payback the investment cost. Contracts for development and production of defense products are usually long-term contracts over many years by the companies that take a long time to get revenue characteristics.

Fourth, the state is the only end-users and investment profit is very low due to limited quantities and the uncertainty of the market and low investment efficiency. The government in the defense industry market demand do play a pivotal role as a monopolist, and accordingly the tax, regulation, and the right to enforcement powers.

Finally, due to the above characteristics and security issues, private companies faces management problems and are difficult to enter the defense industry market. Nevertheless, defense industry is necessary and indispensable to us for the national interest in terms of national security and the leadership of the global world in the rapidly changing situation of the international political dynamics.

The defense goods market and the general civilian goods market have different characteristics like these.

First, the price of the defense goods is not determined in the market by demand and supply. The price is determined by the defense budget and the provider's cost, depending on performance. Government within a limited range of positions in the defense budget required to secure the quantity. Variety of cost data can not be obtained. On the other hand defense companies tries to compensate cost and also try to achieve profit maximization.

Second, because of the only one demand for the defense market production, the quantities are limited. Thus, changes in the quantity required exceeds the production capacity or idle equipment occurs, adding to the fixed cost burden.

Third, due to the characteristics of defense products, suppliers are limited, and the relationship between the government and supplier has the character as a bilateral monopoly.

Fourth, the quality, performance, reliability of defense material and product is necessary for national security. So these reliability may be more emphasized than the economic aspects.

Section 2. The Features of Korea Defense Industry

Korea defense industry is characterized as follows.

First, the defense industry has important role due to the security environment. Korea have been divided by north and south. South and North Korea are facing a military confrontation, particularly the great powers around the peninsula.

Japan want to build military powers and military buildup aimed at implementing rearmament policy. China is seeking military power recently on the basis of the rapidly growing economic power. Russia also want to have the traditional military powers. Under these circumstance and international situation Korea needs to be fostered and developed from the security level to protect their country.

Currently, it is possible to easily introduce foreign weapon systems such as the United States and Europe if there is economic power. In the long term, it is necessary to develop the defense industry so that it can procure necessary defense products in Korea. In particular, it is absolutely necessary from a long-term perspective to break away from dependence on military technology for key parts.

Second, the Korean defense industry is taking a form in which companies participate under the leadership of the government. In other words, it has been developed by the government planning, coordination and control. In particular, in the 1970s, the defense industry had the highest priority under the top government support.

Third, the Korean defense industry has a dual structure. The Defense Science Research Institute (Agency for Defense Development:ADD) is in charge of R & D

and the defense industry participates as a prototype company and plays a role in production / manufacturing, except for some fields. This was accomplished by division of duties in defense-related fields in the early days of the defense industry. This is suitable for the structure of conventional weapons development, but in the current high technology weapon development the other development system is need to improve.

In addition, Korea's defense industry companies is privately owned by the private owner. But there is a big difference in the concept of operation compared to the systems of advanced countries such as the US, Israel, UK, and Sweden. In the case of advanced countries, the defense industry plays a leading role in R & D, production and acquisition of weapons systems. But Korea defense industry companies are focusing on the production of prototypes.

Fourth, Korea's defense industry is dependent only on limited domestic needs. With the exception of some items, domestically produced defense products depend only on domestic demand, so they are only produced in small quantities and buy a small amount of small-volume production. As a result conventional weapons production company factory utilization rate is low.

Fifth, with an unclear vision for the defense industry, preparations for future warfare are insufficient. Lack of awareness to the defense industry importance, unstable weapons acquisition, lack of awareness about security, due to uncertainty about the future, defense industry companies do not have the will to develop new weapon systems.

Chapter 3. The History of Korea Defense industry development

Section 1. The changes of Korea Defense Industry over time

Korea's defense industry has reflected the security situation. In particular, with changes in relations with North Korea, changes in ROK-U.S relationship, changes in the domestic political situation, the Korea defense industry policies have been

constantly changing. Thus, Korea's defense industry is closely related to national security environment and national policy decisions.

1. The dawn phase (1970 previous step)

In the early 1960s North Korea had activated defense industry continuously to promote. In early 1970s, the military equipment modernization have been archived, and declared that they were ready for war. Based on the experience of the Korean War, North Korea has continuously developed the defense industry. On the other hand, due to economic difficulties and US military aid, Korea did not make effort to promote the development of the domestic defense industry.

However, since the mid 1960's, a naval ship was bombarded and killed 39 people by in North Korea coastal port artillery. In 1968, such as armed attack on the president Park office and U.S. naval ship Pueblo hostage crisis, unstable security situation gradually became aware of defense industry importance. In addition, according to 1971 U.S. doctrine, including the U.S. 7th Infantry Division to withdraw, the military environment changes, president's strong will, based on the strong commitment and public support, the defense industry was born as the need for independent national.

2. The foundation phase (1971-76)

In January 1970, President Park Chung-hee addressed in his New Year press conference. He expected that the first half of 1970s would be the great tribulation period, so emphasized national security, self-reliant defense preparedness.

During the first visit to the Ministry of Defense on January 19, he emphasized the urgency developing defense industry for the purpose of cultivating self-reliant national defense power. He officially expressed his will to foster the defense industry for the first time.

As a result, the defense industry policy goals 'the creation and a foundation of defense industry basis, basic weapons domestic production' was set up. A new

government department which is dedicated to the defense industry was founded. And in Changwon, Gumi Industrial Area, the defense industry factories were established. For continuous the defense industry support, on December 17, 1973, "a major defense procurement Act on Special Measures (Act No. 2540)" was enacted. Also, "Yul-Gok project" plan, named the military eight years (1974-81) to establish the foundation of the defense industry was the composition.

3. The Settlement phase (1977-81)

In the late 1970s, greatly increased the Yul-Gok project budget and funds for the defense industry, defense industry was more effectively supported by the government. The foundation for the defense industry to produce basic conventional weapon systems was laid.

The mid-1970s after the government's strong defense industry promotion and the heavy and chemical industry policy priorities of our capital and technology beyond the capacity made inflation by causing the overall investment efficiency. However, in 1977 the United States President Carter Administration tried to withdraw U.S. forces and tactical nuclear weapons. Due to these U.S. policy commitment, to complete self-independent defense industry has become urgent task.

The main stage production in this period of the 4th 5 year economic development plan of until the end of the 1980s, were guided missiles, aircraft, tanks, precision weapons, goals the localization of vessels and the holding ability were set

In addition, during this period Korea could only produce limited the basic infantry weapons and artillery, it was considered impossible to develop the mobile weapons such as armored vehicles domestically. But in 1979, an attempt for the development of armored vehicles was determined as self-reliant defense. As such, in Korea's defense industry, consistent defense industry policies were actively pursued from the determination of requirements to development and production.

4. The Expand the development phase (1982-90)

After that, at the Defense Industry Promotion Expansion Meeting in March 1980, the government set the stage of expansion development aimed at establishing the foundation for independent weapon system development and mass production of high-precision weapons after 1982. Based on economic feasibility, the private sector led industry and secures its own capabilities. The policy was changed from government initiative to private initiative.

President Chun, Doo Hwan's Administration had emphasized the Korea and U.S. joint operation, interoperability of weapons systems. As a result, the most of the weapon systems were purchased directly from the U.S. It also delayed the opportunity to build an independent high-tech weapon system production capacity through R & D. On the other hand, many independent weapons were developed and produced. Considering R & D and production of new weapon system taking an average of 10 years period, it can be said that this performances are the result of R & D investment in the 1970s.

In addition, it became more difficult to obtain high technology due to the reduction of US technical assistance to Korea and the strengthening of controls. But rather, it became an opportunity to sublimate to the development of the private sector led defense system for improving the performance of existing equipment and developing independent weapons.

During this period, the 2nd Yul-Gok project (1982-86) was promoted to supplement defense power and to improve the quality of power. It has made a huge difference both quantitatively and qualitatively. In terms of budget, the scale of defense spending has risen sharply due to the growth of the national economy, which has reached 5% of GNP every year. The scale of the Yul-Gok project, which was about 50 billion won in 1974, increased by more than 10 times in 1980. The Yul-Gok project in a unit began to expand.

5. The Leap stage (1990~present)

Kim, Young-Sam and Kim, Dae-Jung Administration had expanded R & D to develop its own weapon systems. But its performance was poor.

The reason is that. Since 1990s, when raising a requirement for a weapon system, the ROC has been selected based on the weapon system performance of advanced countries without considering the technological level of the Defense Science Research Institute or domestic defense companies.

Such weapon system performance could not be satisfied with domestic technology. In addition, compared to direct introduction during R & D, the cost-effectiveness was significantly lower. As a result, we had to import weapons systems directly from abroad. These vicious circle has been repeated. The gap between the technological level of the increasingly advanced weapon system and the domestic technology level is getting wider.

Also, since the '90s, the north and south summit, expanding exchanges, reconciliation and cooperation has brought about a major change in the national and people's view of security.

This immediately had a huge impact on the defense budget, reducing the manpower and budget of the Defense Science Research Institute(Agency for Defense Development : ADD). The government's policy support was greatly reduced, such as reducing financial and tax benefits for defense companies.

However, in recognition of the recent crisis in the defense industry, they are facing a turning point for a new leap forward by seeking various directions for development such as the K1A1 tank development, mass production and export, K-9 self-propelled howitzer, the world's fifth-largest Korean Aegis warship launching, KT-1(basic trainer), T-50 (the domestic supersonic advanced trainer) development, mass production and export, the start of development of KHP (Korean helicopter).

Defense News, a US military magazine, selected two Korean defense companies (KAI: 79th, Rotem: 93rd) as the world's top 100 defense companies. And it reported that

'Korean government is actively pursuing efforts to increase exports of weapons and military equipment. In 3~4 years, the export volume is expected to quadruple to $1 billion. It was reported that the Korean defense industry is emerging as a global power producing world-class products'.

Table 3-1. Korea Defense Industry Evolution

Division	Based on phase composition	Settlement stage	Expand the development phase	Bound phase
Period	1971~1976	1977~1981	1982~1990	1990~현재
Main Content	- Development and Production of limitation - Introduced the production technology	- Default weapons Localization - Development of advanced strategic weapons	- Independently developed Infrastructure Development - High-precision weapons Mass production	- Take high-tech weapons Concentration - Overseas procurement, Production technology adoption Major policies
Major policies	- South Korean Modernization Implementation plan ('71) - Defense Research Institute Established ('72) - Development of domestic arms Committee Structure ('75)	- Long distance Missile Successfully launched ('78) - Starting weapon armor Development decisions ('79)	- U.S. foreign technology Previous suppression policy / Reciprocal field Joint Research - Abolition of defense tax ('91)	- Long-term defense Research and Development Plan - Domestic and Promote diversification policy - Defense reform Legislation ('06)

Table 3-2. Major weapons systems and development projects

Division	Main Activities	Goal
1st ('74-'81)	- Rifles, mortars, howitzers, and various ammunition, surface - Missile development and production - Predator production - F-4 fighter aircraft introduced	Power to secure at least the defense
2nd ('82-'86)	- K-55 self-propelled artillery, K-1 tanks, K-200 armored personnel Development of some production - Korean Navy patrol, escort production	Defense Power Complementary

Section 2. The problems during the early Korea defense industry developing period.

1. Weak government support to the Defense Industry

Because the defense industry has a higher level of risk than the civil industry, many companies cannot easily participate, and there is not enough support from the government to participate while taking these risks. However, the state-based industrial and national defense industry to determine the survival logic of the market by industry because it can not be left untreated. Therefore, in spite of the need for continuous support policies for the defense industry to be pursued in terms of ensuring national security and promoting national interests, Korea has been riding in the peaceful mood since the 1990s. As Korea has reduced its defense spending and greatly reduced its defense industry support policy, many problems have arisen. The reduction in defense spending resulting from the government and the people's easy attitude toward North Korea and neglect of idle defense facilities can be said to be the fundamental causes of today's defense industry facing a crisis.

1.1. Security situation and public awareness changes

North Korea, without a change of consciousness, has consistently pursued communist reunification. On the other hand, with the passage of time and the change of government, the Korean people's view of North Korea has changed little by little. Many experts think that it is now reaching a dangerous level. The government also provided unpaid unilateral support to North Korea through its "inclusive policy toward North Korea," which had been ongoing for decades. Taking advantage of this domestic atmosphere, the public is also widely viewed critically about policies that increase defense spending in peacetime and expand spending on the defense industry due to a change in security awareness.

1.2. Limited Defense expenditure and R & D expenditure

Today's war is pursuing a short-term and decisive battle using accurate information and precision strike capability. This trend will intensify in the future. Therefore, our defense industry must also keep pace with these changes, but there are many restrictions due to limited defense expenditure and R & D expenditure.

In the early 80s, Korea's defense budget which was 5.9% of GDP, has been continuous decreased into the current 2.6% of GDP versus (in 2020), It is maintained, now. Right now, due to the lack of this defense expenditure, the combat capability of our military buildup maintain the existing power and weapons systems for the concentrate as well, requiring long-term investment for your interest in the defense industry, there is no energy for two.

In addition, defense research and development of our country's investment steadily increased from 2.5% in the 1990s to 7.8% in 2020. Comparing to United States, 13%, UK 11.4%, France 15%, etc, ours is still very low, in terms of the amount of U.S. 1 / 69, Britain's 1/6.7, 1/5.3 the level even lower in France.

Table 3-3. R & D investment among national defense expenditures

Division	70~79	80~89	1990	1995	1999	2000	2001	2002	2003	2004	2005	2006	2007
R&D Investment ratio (%)	2.33	1.62	2.54	2.90	5.1	5.2	4.5	4.7	4.1	4.1	4.3	4.7	5.1
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	5.4	5.6	6.1	6.4	7.0	7.1	6.5	6.5	6.6	6.9	6.7	6.9	7.8

Source: Department of Defense Office of Research and Development Resources site
2018 Global Defense Market Year Book(Defense Agency for Technology and Quality), p. 34~39.
Defense Acquisition Program Administration, 『Defense Business Statistical Yearbook』 (Gwacheon: Defense Acquisition Program Administration)

1.3 Insufficient treatment to the Defense industry idle facility

Defense facilities must be maintained above a certain level, even during peace times to smoothly supply essential materials for wartime. Due to the idle defense equipment and facility left idle for a peacetime, military contractors have a serious impact on the management. But the government has yet to come up with a way to clearly solve this problem.

Defense facilities in order to minimize the idle display the amount of materials needed for the accurate prediction of the items and should be preceded, Based on this, the scale of the defense industry should be established. Exhibition materials and defense equipment to be maintained for the replacement should be established for the defense industry. But this is now beyond the capabilities of defense companies. So the government's active support and efforts to engage should be preceded.

2. Limited Research & Development

As the influence of weapon systems on the victory and defeat of war is increasing, each country is trying to have a more precise, quick and reliable weapon system. Korea is also building an advanced power structure to build a strong military. But, due to the lack of R & D capabilities in the domestic defense industry, most advanced weapon systems have to be imported from abroad.

Analysis of the causes of the decline in the development level of Korea's weapons systems is as follows.

2.1 Acquisition of weapons mainly imported from abroad

The production capacity of High-tech weapon systems that require advanced technology cannot be achieved without long-term investment and effort. However, long term, Korea military's defense industry did not have a long-term vision for the development of the defense industry. Equipment was acquired only through the fulfillment of the time to deploy the weapon system and a simple cost-effectiveness analysis. The weapons acquisition policy has been favoring overseas introduction. Key weapon systems and components were acquired by especially direct import, rather than independently development. This ultimately led to the loss of opportunities for domestic R & D. It became a decisive cause of deepening the subordination of defense technology.

Recognizing these problems, the Ministry of National Defense presented a policy

direction to actively foster the domestic defense industry by shifting the focus from 'planning acquisition' to 'technology accumulation' for weapon acquisition. However, it is being promoted by the policy of having weapons within a fixed period. In 'Defense Reform 2020' or 'Joint Military Strategic Goal Plan', the future weapon system that the Korean military will possess is presented below. Most of them are planned to be imported from abroad, such as reconnaissance satellites, aerial early warning systems, electronic warfare weapon, Aegis destroyers, aerial tankers, and next-generation fighters.

The Korean military did not properly consider the level of technology possessed by domestic defense companies when raising a requirement for a weapon system. Military Operational Required Performance (ROC) was raised based only on the performance of advanced weapon systems produced by advanced countries in the defense industry. For these reason, most of the acquisition has come to depend on foreign imports.

Due to the military weapon requirement that was not connected with domestic technology development, domestic defense companies are losing opportunities for R & D.

Table 3-4. A vicious cycle by overseas weapon acquisition[1)]

① Needs requiring : high-tech equipment / early combat weaponization ② Domestic technology / defense abilities : long term requirement / distrust ③ Method to obtain : Direct import from overseas ④ R & D / production : not activated yet/ productivity weakens ⑤ Skills Ability : further deterioration / distrust	⇒	Vicious circle Cycle	⇒	Deepening foreign dependence and subordination

1) Min, hyeonggi, "a new paradigm of power acquisition proposal," Defense Industry Association hand, 『defense and technology』(Seoul: Korea Defense Industry Association, 2000). p. 28.

2.2 Lack of activation of the defense industry research and development

On average, defense companies' investment in technology development does not exceed 1.6% of sales. In the case of the private manufacturing industry, it is 2.31%, and in the case of advanced countries, it is 3~3.5%. Considering the fact, the level of investment in technology development for the defense industry is weak. There are two main reasons why defense industry R & D cannot be activated. One is the structural problem of the defense industry, and the other is the insufficient government support policy for R & D.

The defense industry in Korea maintains a shared system in which R & D is carried out by the Agency of Defense Development (ADD : Defense Science Research Institute), production is carried out by the defense industry, and maintenance is carried out by the military. So, the defense industry not only concentrate on the simple production of research and development work has been neglected.

Also, if companies carry out their own research and development studies at risk for failure, despite the existence of the government compensation and extremely too small compensation. In other words, although the company takes the risk of securing the development cost and development performance, the compensation for the development cost is calculated based on the strict input cost. It does not recognize the development cost invested before business approval, which is a factor that lowers the company's own R & D motivation.

Section 3. Defense industry's structural problems

In defense industry, there is structural problems like insufficient ability to develop advanced technology and lower utilization rate due to manufacturing-oriented roles. Until now, our defense industry has been operating in a way that separates development and production, in which basic weapons are developed by the Agency of Defense Development (ADD) and then produced by the defense industry. In the 1970s and 1980s, when the defense industry began to develop, this division of labor was effective for mass production of simple basic weapons. However, at present,

when small-scale production of advanced weapon systems is required, it is a major cause of lowering the utilization rate of defense industry equipment.

Table 3-5. Construction and sales of defense industry trends

(Unit: KRW 100million /%)

Division		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
No. of defense		82	82	81	80	78	78	78	83	82	86	88	85	88
Sales		25,840	31,132	34,402	33,879	31,511	33,359	37,013	43,447	42,681	46,440	53,165	54,517	61,955
Operating profit		1,186	1,473	2,619	2,030	1,559	2,130	1,617	1,545	1,543	1,413	2,500	2,673	2,629
Profit Margin	Defense	4.6	4.9	7.6	6.0	5.0	6.4	4.4	3.6	3.6	3.0	4.7	4.9	4.2
	Manufa-cturers	6.9	5.4	6.5	4.9	5.0	6.8	5.4	6.2	6.7	7.2	6.1	5.3	5.8
Utili-zation rate	Defense	56.0	55.7	56.9	52.8	50.8	48.5	50.3	54.4	57.3	56.1	57.8	61.0	59.8
	Manufa-cturers	81.6	81.4	79.9	81.1	76.6	78.3	75.3	78.3	78.3	80.3	79.8	81.0	80.3
Division		**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
No. of defense		90	91	91	95	96	97	95	96	100	101	91	87	88
Sales		72,351	87,692	93,303	93,095	93,429	104,651	119,883	142,651	148,163	127,611	136,493	144,521	-
Operating profit		3,625	5,338	6,898	5,323	4,230	2,435	5,352	4,710	5,033	604	3,252	4,875	-
Profit Margin	Defense	5.0	6.1	7.4	5.7	4.5	2.3	4.5	3.3	3.4	0.5	2.4	3.4	-
	Manufa-cturers	5.9	6.1	6.9	5.6	5.1	5.2	4.2	5.1	6.0	7.6	7.3	4.4	-
Utili-zation rate	Defense	60.3	61.8	59.5	59.4	59.0	58.0	66.8	68.6	68.6	69.2	71.2	72.0	-
	Manufa-cturers	77.2	74.6	81.2	79.9	78.1	76.2	76.1	74.3	72.6	72.6	73.5	73.2	-

Source: Department of Defense, 『National Defense Statistical Yearbook』 (Seoul: Department of Defense, 2006), p. 288-290
Defense Acquisition Program Administration, 『Defense Business Statistical Yearbook』 (Gwacheon: Defense Acquisition Program Administration, 2021), p. 209-210

The utilization rate of Korean defense companies has steadily increased from 50% in the 1990s to 72% in 2019. However, the number of defense companies, which steadily increased in the 2000s, started to decrease from 2018 and decreased to 88 in 2020. This is maintained at a level lower than the average operating profit margin of manufacturers, resulting in a number of defaulters due to low profitability.

However, in 2018, the utilization rate of the defense industry exceeded 70%, showing a similar degree to that of the general manufacturing industry. Nevertheless, the

operating profit margin is still around 60% of that of the general manufacturing industry, which can be a prime example of structural problems in the defense industry.

Section 4. Low competitiveness in the defense industry export market

The biggest reason why Korea's defense exports have weak competitiveness in overseas markets is that defense export goods are expensive compared to their performance. This is because cost increases by providing benefits from the introduction of core technologies and parts for defense industry products from abroad.

One of the major reasons is the lack of strategic export items that could draw the attention of the global market. The level of technology in Korea's defense industry is still far behind that of advanced countries in the defense industry. In order to overcome this, it is necessary to strengthen competitiveness in the international defense industry market by possessing export strategic items through the development of original fields such as new material development and advanced software development.

However, Korea is experiencing difficulties in enhancing its competitiveness in the defense industry because there are no such strategic items. Recently, defense industry products such as the K-9 self-propelled artillery and the T-50 trainer are showing solutions to the problems described above.

1. Limited munitions export market information, limited support

In order to export defense materials, sufficient information about the purchasing country must be supported. However, since most of the trade of defense industry materials is done in a state-to-state form, there is a limit to the private defense industry's ability to acquire such information.

In particular, the government's sufficient information support is required for the non-planned acquisition plan for the purchasing country, operational performance

required, information on policy makers, and marketing strategies of defense companies in that country.

In the case of Korea, market information on purchasing countries is obtained by using defense officers and military attaché, but information support work for exporting defense industry materials is not specified, so the scope of information is limited and systematic management is not carried out.

2. Weak marketing activities

Countries around the world regularly hold air shows and weapon equipment exhibitions to export defense industry products, and are strengthening promotional activities using military officials and foreign missions in their host countries. However, the promotion and marketing activities of our defense industry products are insufficient.

To promote defense industry products, a defense industry product exhibition hall is being operated at the War Memorial of Korea, but the number of companies using it is limited. Although air shows are held for the promotion and marketing of defense industry products, the order performance of defense exports through this is very weak compared to developed countries.

For example, Korea held the Seoul Air Show in 2001, and a contract worth $580 million was made. However, the UK hosted the Farnborough Air Show in 2002, which resulted in a $52 billion contract during the air show. This was the result of the British government and private companies working together to promote and sell British weapons systems. It is said that the operation of a close cooperative system between the public and private forces is essential.

3. Limited consultation with the U.S.

In the meantime, Korea has developed most of its defense materials with technology transferred from the United States. When exporting defense materials produced through technology transfer abroad, export is possible only after obtaining the

approval of the United States, and the items subject to export are also limited. In addition, one of the factors that makes export difficult is the fact that the purchasing country is required to submit the certificate of the end-use (EUC : End Use and Non-Transfer Certificate) and the sender to a third country directly to the US government.

This makes it easy for the US to collect information obtained from the purchasing country, but the fact that the purchasing country has to submit the EUC to the US government rather than Korea can be a matter of pride. Even if not constrained by the system, the export of offensive weapons is influenced by the political relationship with the United States.

The United States has announced an arms embargo on the grounds that Venezuela is uncooperative in its efforts to contain terrorism. As part of that, they demanded that South Korea ban the export of offensive weapons to Venezuela. Meanwhile, South Korea had tried to export communications equipment, mortars, patrol boats and aircraft. Korea tried to overcome economic difficulties through exports. Korea faced difficulties at the time when it had to increase the affinity with the third country market, not just the relationship with the United States

Chapter 4. The impact on national economy by the defense industry

Before studying the defense industry impact to the national economy, we need to look at the effect of military expenditure. The effect of defense spending, military expenditure may vary depending on the level of the country development and the economic size. So we divided the world two group as developed and developing countries and analyzed the two group's military expenditure impacts.

The military expenditure, defense spending benefits are as below.

First, both types of countries experienced the under-consumption effects and under-investment effects in demand side by defense spending. Second, the countries may experience direct effect of technological innovation in defense industry. When

the spin-off effects spread all over the private sectors in the country, economic growth rates will be increased a lot. Third, some defense expenses are used in constructing social overhear capital (SOC), infrastructure and providing public goods in the other forms, defense expenditure will stimulate even higher economic growth. Fourth, the defense spending, military expenditure is used for the military training, education, social welfare. These provision can make the social spill-over effect, which acts as a growth engine in developing countries. Strengthening their human capital resource activities can be utilized in the private sectors in the future. Fifth, defense spending plays an important role of providing the safe security environment all over the country, which can contribute to economic growth by ensuring both domestic and foreign capital investments.

Defense spending is neither wasteful nor counterproductive in terms of effective demand and purchasing power creation. According to one study, about 77% of defense expenditure is returned to the national economy in the form of added value. The production inducement effect of defense expenditure in the industry related input - output analysis is higher than that of other industry excluding the formation of government fixed capital. In other words, although production inducement effects of defense expenditure are less than production inducement effects of manufacturing, electricity, gas and construction, it is significantly higher than those of the other industries.

Section 1. Israel defense industry's effects to national economy

Until the late 1960s, the defense industry was considered to have little macroeconomic effect, but this changed in 1967 after the war. Israel suffered economic recession in the mid-1960s. Israel has undergone expansion and production of war materials, the French imposed embargo was a decisive factor in restoring economic activity.

In particular, it has created vast employment opportunities and provided attractive jobs for scientists and engineers who have recently entered the country.

This also led to a remarkable expansion of investment, which led to the concentration

of demand for the defense industry, namely technology intensive industries. The growth rate of these industry increased a lot.

From 1968 to 1984, the electronics, aerospace and optical equipment industries increased by 6%~24% of the total industrial output, which accelerated development included not only quantitative but also qualitative. Mechanization level jumped high. Quality standards and advanced quality control system, this formulation has been introduced so forth. These advances were not limited just in the defense industry, but spread through the whole industries. Thus, defense industry was an important model of modernization. So, defense industry was an important model of modernization, gave a major contribution to overall economic growth. Moreover, defense production has contributed to the geographic distribution of population and industry, which has been an important policy target for Israel. After all, as mentioned above, the defense industry in the late 1970s and 1980s grew due to increased exports and contributed greatly to the trade balance of payment during that period.

By adopting the self-sufficiency doctrine in Israel, primarily for strategic and military reasons, demand for defense goods increased, stimulating defense industry growth. The large amount of natural resource were used to develop this industry and to expand various industrial infrastructure. Since the late 1950's, with government support, large resources were devoted to industrialization, laying the foundations for a diversified industrial infrastructure and providing managerial and technical experience. Higher education and technical training, technical assistance also greatly expanded, and the ability was also improved. In fact, between 1968 and 1984, the number of scientists and engineers in the manufacturing sector increased by about 10% per year.

However, the rapid growth of the defense industry has also been criticized from time to time, indicating at least three apparent undesirable macroeconomic effects as below.

First, the defense industry is inherently unstable economic activity. It is too difficult to predict the demand fluctuation, but it also cause instability in the entire industry,

and even affect the entire economy.

Second, there may be a crowding-out effect, which may slow the growth rate of the private sector. In other words, a limited number of scientists and engineers competing with the wages cause a sharp rise in private company employers' wage. This wage increases makes it hard for civilian companies, who sell their products in competitive markets, to recruit and employ highly compensated skilled manpower, which was a major obstacle to their growth. The negative crowding-out effects was more significant than the positive spillovers effects of technology transfers from defense to civilian industries.

Third, this criticism has some overlap with the crowding-out effects argument.

Even though Defense industry makes a positive contribution to other areas, if the resources committed to private sector, the exports increase and the GDP increase can be created in nationwide economic point of view. In fact, if we compare defense industry companies with private companies in terms of R & D expenditure and average export performance per skilled worker, we can easily see that the private company's rate of return is higher. But the problem of instability did not visualized. The only one economic sector, the defense industry in Israel has maintained such a high sustained growth and stable activity. When defense production eventually was reduced in the 1990's, its weight in the economy was already relatively low, and the macroeconomic effect was negligible. Crowding-out effect is the short-term phenomenon. The private high-tech industry grew rapidly in the late 1970s. The achieving growth in just 5 years, is similar to that of the defense industry in about 15 years.

Such development could hardly have taken place, if civilian industry had not followed the path already opened by an advanced defense industry. Most of all, without defense industry's outstanding contribution to the supply of skilled manpower and high quality human capital, these development could be archived.

Employment opportunities offered by defense industry stimulated demand for education in the sciences and engineering, encouraged Israelis who studied high

technology abroad and encouraged to return, prevented brain drain and helped absorb immigrants with academic education.

Therefore, even if the defense industry was delayed compared to the development of other industries, the industrial base and the human base quickly catch up the gap and achieved impressive achievements. Spillover effects in terms of direct applications of military technologies in civilian uses were indeed limited, but other more indirect effect led to outstanding results.

For example, when a company starts management in the military field, based on their accumulated technical know-how and experience, it will gradually become a leader in the new field. Other companies were set up by former defense industry employees, or had such people as their technological backbone, and joined the civilian market from the start, making use of know-how and experience acquired in defense development and production. In 1990 such companies reached thousands. Most of those companies are still immature, and the global high-tech crisis has negatively affected their prospects. However, some companies have achieved international recognition as technology leaders and are highly regarded in international capital markets. The third argument ignores the non-economic reasons that lay the foundation for the defense industry. This does not take into account the total economic output by the defense industry, particularly some microeconomic advantages.

Section 2. The effects to Israel domestic military production

Domestic military production should meet the economic criteria. However, a simple comparison of domestic and import prices is insufficient as a means to prove economic advantage. From a national economic standpoint, the cost of dollars raised through defense import substitution should be compared with the cost of foreign currencies obtained through other means.

However, given the special circumstances of Israel, which the most defense imports are financed with American aid grants finances are related to US aid, domestic

defense production, by definition, is not economical decision.

While aid grants certainly affect the price of foreign currency-when they increase, the exchange rate is likely to decrease and vice versa-they are not different in this respect from other inflows recorded in the balance of payments. The standard economic criterion for import substitution is therefore valid as well for domestic defense production in an economy provided with targeted foreign aid.

At the same time, it does not imply that the dollar saved by domestic production must be below the effective exchange rate in every case. The criterion sets a reference price, and every deviation from it has to be justified by means of the non-economic advantages of domestic producton, self-sufficiency, operational advantages and so on.

The main doubts in Israel regarding the economic rationale of defense production arose from the apparent impossibility of realizing economies of scale. The large fixed costs involved in defense projects - large investments in R & D, production infrastructure and special equipment-require large scale, continuous production to break even, while in Israel production runs are relatively small, and often fluctuate over time for budgetary reasons. The truth is, however, that arms markets are oligopolistic in nature, and prices are not so closely associated with production costs in which advantages of scale lie.

Moreover, weapons systems and military equipment are produced in small runs everywhere, and for many items Israeli production runs are no smaller, especially when local demands are augmented by export sales. At the same time, certain factors make defense production in Israel cheaper than abroad. In technological capabilities may have a comparative advantage, and Israel maintains a highly developed scientific and technological infrastructure, as it has relatively abundant skilled labor. Indeed, the cost of skilled labor in Israel was lower than any other producers of arms and military equipment in the major industrial states.

Furthermore, battlefield experience gave Israeli users a unique ability to define and specify operational requirements. Close contacts between users and developers made

it possible to translate requirements accurately and effectively into development and production programs. Such conditions led to economies in R & D resources, and shortened processes of malfunction detection and correction. Finally, the superpowers, the United States, tend to develop weapons systems and equipment that can be used anywhere in the world, which are thus more expensive. Israeli production was free to focus on a narrower range of performance capabilities, more suitable to the local climate and the size of the arena, and more compatible with IDF warfare doctrines. This too brought cost economies, and improved the cost-effectiveness of indigenously produced military equipment.

The most convincing proof of domestic defense production efficiency is the success of Israeli defense exports. Defense exports competed successfully in the world arms market, though in no instance where they granted direct government subsidies. Besides, at the time exports were growing rapidly, sales expanded mainly to Western markets where transactions are especially price-sensitive. Exports were generally profitable to the companies involved, and as regards the national economy, a study of two-thirds of the defense exports in the later 1970s showed that the cost of a value-added dollar in defense export was on average only 0.85 of the effective exchange rate for imports.

Chapter 5. General implications from the developed countries Israel in defense industry

Section 1. General implications from the defense industry Israel

1. Overview of Israeli defense spending

Since independence in 1948, Israel's defense spending has been steadily declining. Defense spending in 1953 was less than half of defense spending in 1948. After several wars with neighboring countries in the Middle East, the country's defense spending decreased considerably as the country shifted to a peaceful mode, but there is another reason for the reduction in defense spending.

First, major powers like US, UK began to restrict arms supplies to this region to maintain a certain position in the Middle East. Second, Israel at that time had suffered severe government budget deficit, had to retrench public finance.

Since 1953, because of these two reasons, Israel reduced military spending. To look over these situation, we can divide two period for almost 50 years.

1.1. 1954-1975 : a sharp increase period in defense spending

1st Middle East War (Revolutionary War) : 1948
2nd Middle East War (Sinai War) : 1956
3rd Middle East War (6-Day War) : 1967
4th Middle East War (Yom Kippur War): 1973

1.2 Since 1976 ~ Now : a gradual reduction period in defense spending

Table 5-1. The figure of Israel military

Year	The average annual rate of change (%)	Index (1953 value = 100)
1954-55	26	159
1956	100.0	317
1957	-31.6	217
1958-60	4.4	247
1961-66	13.8	536
1967	76.5	945
1968-70	23.8	1,792
1971-72	-3.0	1,686
1973	63.9	2,764
1974-75	7.1	3,170
1976-77	-16.4	2,216
1978-85	1.5	2,499
1986	-13.7	2,157
1987-91	1.8	2,353
1992-95	-3.4	2,052
1996-01	2.8	2,421
2002-06	2.2	2,706
2007-11	-0.5	2,639
2012-16	-0.8	2,556
2017-18	-0.2	2,546

Source: SIPRI, 'SIPRI Yearbook' each years
IISS 'Military Balance' each years

2. Configuration of Israeli military spending

Defense spending can be divided into domestic demand and imports. Domestic spending can be divided into labor costs, domestic acquisition and domestic service cost. And import parts mainly consist of international weapon acquisition.

The configuration change of defense spending changed can be seen in 〈Table 5-2〉. These changes came partly the amount change of product factors and partly from the relative factor price change.

The most noticeable change is related to the labor portion. Early 1950s, labor costs accounted for about half of total defense spending. On the other hand, in the mid-1970s, it steadily decreased to less than 20%. However, in the following years, this trend reversed and continued to increase until the 1990s. Two phenomena stand out in this flow of change. First, the decrease in the labor cost ratio can be mainly attributed to a smaller increase rate than that of other defense spending factors, while labor rates are not rising relative prices comparing to other prices. Second, the decrease in labor costs is related to a sharp increase in total defense spending. Decreased labor costs was closely related with sharp increase in the total defense spending. Inverse relationship of total defense spending and labor costs are associated with the high rigidity of military human resources' expenditure.

Table 5-2. The Israel's Annual defense spending

(%)

Year	Labor Cost	Domestic spending	Defense goods imports
1955	49		
1960	35	40	25
1966	29	38	33
1970	18	37	45
1975	15	35	50
1980	23	37	40
1984	26	39	35
1990	37	37	26
1995	47	33	20
2001	43	32	25
2009	19	28	53
2011	24	67	40
2013	16	35	62
2015	7	22	84
2017	10	10	76

Source: SIPRI, 'SIPRI Yearbook' each years
IISS 'Military Balance' each years

The changes of labor spending and Defense Goods Import were opposite. The import portion has steadily increased, reaching 50% in the mid-1970s. At that time, there was the Yom Kippur War (4th Middle East War), massive US superior weapons system was introduced in Israel. Since that war, the import of US weapons system had been decreased.

The most of the defense spending is focused on acquiring new weapon systems and imported equipment. So these were inevitably the first targets of budget cuts. But in fact, the expansion of imports was rather than the result of the U.S. military aid changes. Since the mid-1980s, U.S. military aid has been stabilized in financially, but the weapon amounts has been reduced considerably.

Section 2. The characteristics of defense goods export and defense industry

1. Israel's defense goods export

With relatively small domestic market and small economy, Israel is trying to expand the demand side by exports, especially defense goods' exports for economic growth. In 1970s, about 18 percent of all Israeli labor force were employed in the defense industry. In 1995, 5%~7% of the all Israeli labor force were directly related with the defense industries. Considering indirect labor forces, more than 10% of Israeli labor forces were employed in defense industries. As shown in the defense industry trade volume and employment statistics, Israeli defense industries give very huge impact to the Israeli national economy. But because Israeli defense forces(IDF) demand for defense goods are competitively small, Israeli defense industries have to export defense goods to maintain defense industrial base and to expanded their industrial territories. That is one of government's key export policy.

In principle, Israel government does not give subsidies to state-owned defense industry companies, but provides a lots of support such as non-tariff benefits to private companies. However, these benefits are only provided at the initial stages. The principle of competition should be introduced after the initial stages.

Nevertheless, the reason these each company can survives may be closely related with the Israel's core technology-oriented development strategy, and may also be related with the diversification of Israel's defense export market. Israeli exports defense goods to 70 countries in the world, and maintain the close relationship. They do not rely only on the domestic market only, but use the broad world defense industry market. The success in the defense industry may come from technical excellence. In addition to technical excellence, consistent export policy promotion and active marketing should be supported. In the case of Israel, an organization called 'SIBAT' plays the great role of a manager who efficiently manages and promotes defense exports.

Technical cooperation in the Israeli defense exports and attractive multinational corporations are also played an important roles. Israel regard technological cooperation and attracting multinational companies in defense exports as greatly important works. When attracting technical cooperation and multinational companies, it is also important to attract international cooperation at the government level and the private enterprise level. In the case of Israel, in order to stimulate the attraction of foreign companies, the overall benefit is given to the owner of the company. Instead, it is taking advantage of access to capital, marketing, facilities, and new technologies.

In addition to the Israeli defense industry, general industry as well also established active technological cooperation with foreign industries. The export competitiveness of the Israeli industries was made after joining General Agreement on Tariffs and Trade (GATT), joining the European Community and the Industrial Free Trade Zone (1975) and the decision to fully free trade area (1985) with United States. Israel has enhanced the

Competitiveness of exports. As a result, Israel was able to export all items to the European Union (EU) and the United States with tax-free. Israeli domestic producers are now able to target a market nearly 110 times larger than their own. They can attract investors to Israel who wish to export their goods to Europe and the United States with no tariffs. Israeli investors also forged cooperation with Jordanian and

Egyptian businesses in special industrial zones that enable the export of products duty-free to the US and the EU. In this regard, in order to maximize their chances of success, Israeli domestic companies have been trying to find places in the international commerce sector where they can open their own specialized niche markets.

Established international cooperation with foreign industrial has often utilized a blend of local innovations, large-scale foreign production and market penetration in conjunction. It is judged that the active activities of these private projects contributed to the diversification of exports in the defense industry, technical cooperation, and the attraction of multinational companies. International cooperation projects have been undertaken in these areas such as electronics, software, medical equipment, printing, and computerized graphics. Besides, Israel's defense spending accounts for 8% of GDP, and labor force related to defense exports account for 7.5% of the population, contributing to the national economy.

After initial industrialization, the next step of industrialization concentrated on developing and manufacturing arms needed for the defense of the country. It was accelerated because of arms embargoes that endangered the independent state. The large investment in aerospace and defense industry generated new technologies that became the base for Israel's unique hi-tech industries.

In the 1980s, worked in Silicon Valley, the Israelis returned to their home country Israel, opening development centers of multinational companies such as Intel, Microsoft, IBM, and others. In the 1990s, high skill workers, such as scientists, engineers, technicians, and medical personnel, migrated from the former Soviet Union enabled the upgrading of Israel's industry to its current level of sophistication, with its array of export products.

In spite of lack of natural resources and raw materials, Israel's big advantage is its highly qualified labor force, scientific institutes, and R & D centers. Today Israeli industry concentrates mostly on manufacturing products with high added value, by developing products based on Israel's own scientific creativity and technological innovation. Unlike most developed economies, such as US, Japan, Germany, in which

the number of persons employed in industry remained stable or diminished during the early 1990s. But the number in Israel continues to grow, with more than 25 percent of the industrial workforce employed in hi-tech manufacturing. In the past three decades, industrial output has made international-level strides in the fields of medical electronics, agricultural technology, telecommunications, fine chemicals, computer hardware and software, as well as diamond cutting and polishing.

2. Israel's defense industry

2.1 High technology and R & D

Israel's defense R & D and defense industry have clear goals for R & D. Israel's defense acquisition policy-related document preparation system is very long-term and consistent. With this system, consistent policies are established and implemented in the investment operation and the establishment of R & D system through industry, academia, and research links. Israel has focused on the technology-based defense industry. Israeli defense industries, namely private sector companies are in charge of technology development, system development. Defense R & D directly is directly connected to the corporation management. They have to make effort to develop and export their defense goods investing significantly in research and development. These lead to improvement in overall skill level and national economy.

Israeli defense industry had a special background in developing focused on core technology, R & D. In 1950-60s, IDF had doubt whether foreign dependent weapon imports could satisfy IDF's demand in the long run. Therefore, Due to uncertainties, the two policies were adopted, which follows. They Stopped to purchase foreign weapons and try to satisfy the domestic defense demand with their own defense industries. To avoid the foreign dependent weapon system, they decided to make their own defense industry and tried to make highest quality, world best products.

However, imports from France, was made a regular basis. A relatively narrow range of domestic defense industry products was forced to stay. But after the French embargo in 1967, the industrial goals of weapon product operation was expanded. Israel's strategic defense companies were often required to supply strategic weapons,

even major weapons systems that was relied on foreign imports. The development and manufacture of fighters, battleships, tanks, and various types of missiles took place, and the defense industry has been greatly expanded. The self-sufficient supply policy, dominate defense industry policy lasted for the next 15 years.

Because of these policy, R & D, technology-based defense industry, Israel's defense industries were forced on very high technology equipped development ability. Since the defense industry is directly in charge of R & D and system development, the defense industry is investing a lot in R & D, meaning that defense industry companies cannot win management without technological capability. For example, Israel's largest defense electronics firm Tadiran spend more than 7% of sales in investing in R & D itself. And Ellit or TAAS, and other defense contractors invest more than 5% of sales also willing develop its own technology. In addition, Israeli defense industry makes effort for its aggressive research and development.

Israel has greatly reduced the review time for new technologies by simplifying the procedures for raising requirements and confirming projects, so that defense companies can actively participate in basic research, applied research, and search and development necessary for the development of new weapon systems. Government also help to test a new weapon system for evaluation, and to support companies actively at the national level to have a competitiveness.

2.2 Defense industry for export demand rather than domestic demand

After being refused arms transfer from France in 1967, Israel adopted a strategic self-supplied defense policy and at the same time recognized defense exports as a strategic export business model and actively promoted export expansion. As a result, it is now the 12th largest exporter of defense materials in the world. In other words, Israel does not produce any weapons without exporting weapons.

Considering the Israeli their economic size and growth rate, Israel has been pursuing a niche strategy, which at the first, they produce the main part of weapons, and next make its development and performance improvement. For export promotion,

they continue to invite foreign defense companies for air shows and major events, and to conduct diplomatic and high level marketing

Israel's export strategy can be summarized as follows:

① Opening the defense market through technology transfer and price reduction policies, ② Participating the system-integrated weapon performance improvement project for buyer's requirement, and ③ Pursuing diversification of the arms export market such as China, Taiwan, Switzerland, Latin America.

One of the main policy instruments that has contributed to Israel's securing competitiveness in the international defense market is the principle of competition. In order to directly support the military operational, Israeli all kind of defense goods are procured through competition among companies except core defense technology from the point of view efficient use of the defense budget.

For example, military R & D, improving systems, upgrade performance, high-level competition including maintenance, all areas, has adopted the principle of competition. In particular, only except for the case of areas other than core defense technology capabilities, competition is conducted without any discrimination among domestic and foreign companies. These market conditions are constantly require to invest in the domestic defense industry research and raise the export competitiveness by ensuring the performance improvements.

Competition principles has been are applied regardless of ownership. In other words, the inefficiency of state-owned defense companies and government reliance of private military companies are excluded in the market. The principle of free competition is applied to the selection of business operators to improve the competitiveness of defense companies and to export the defense goods regardless of small domestic requirements. Survival and maintenance is possible.

2.3 Companies' continuous international cooperation in defense R & D

Israel developed a new weapon system independently that have not been developed

in any other country in the world based on international cooperation with the US. And the R & D funds supported by the US contributed to Israel's independent weapon system production and technology development and reduced military dependence on foreign countries.

Israel's excellent military technology are proved since the 1982 Lebanon war. Israel & U.S. defense companies' partnerships were formed. Based on the Israeli high quality technology, parts and components for the domestic production capacity, the United States and Israel concentrated on developing the interest areas. At last they can archive the high-level cooperation in the defense industry areas. In addition, Israel is not satisfied with the present situation, and is constantly making efforts to acquire advanced technology development information to predict the future battlefield environment and derive long-term research tasks.

To collect information on foreign technology in the United States, Germany, France, etc., Israel Ministry of Defense organizes operations team. MOD requires foreign diplomats such as military attaché to collect information of technology, and this mission is reflected in the policy.

2.4 Government support for the Defense Export and Defense Cooperation

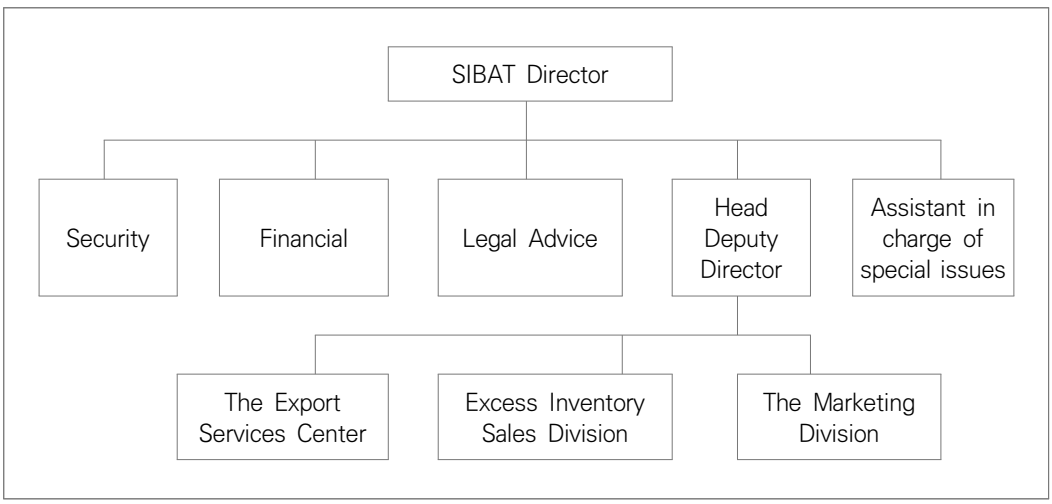
Organization dedicated to Israeli defense exports, SIBAT (Siyuah Veyetzeu Bitchoni, Foreign Defense Assistance and Defense Export Organization) has played a very important role in Israeli defense exports and defense cooperation. SIBAT makes defense export policy and implements all kinds of defense export activities and export-related tasks such as export marketing, export control, quality assurance, export of surplus equipment, business promotion of exhibitions, marketing related information processing, and foreign market analysis. Considering that there is no export organization within the Ministry of Defense or Defense Acquisition Program Administration in Korea, the role of SIBAT is indeed enormous.

Israel's main export items are missiles, air defense weapons, and aircraft parts, HARPY, optical equipment, UAV etc. In 2020, Israeli defense export was $8.668

billion.

The SIBAT organization operates The Marketing Divisions, Excess Inventory Sales Division, and The Export Services Center under the Chief Deputy Director. In addition, SIBAT's global network of connections includes the Israeli military attaché and MOD official representatives abroad. (See 〈Table 5-3〉)

Table 5-3. SIBAT Organization



SIBAT belongs to the Israel Ministry of Defense (IMOD) as the Defense Export & Cooperation Division. But it helps defense corporations with overseas marketing, advisory assistance and training. To promote the export of weapons, SIBAT acts like a private sector organization with flexibility. Through law, politics, security, technology, and marketing, SIBAT controls all kinds of the defense export and activities. And it also sells selected equipment and used equipment. SIBAT was founded in 1971. SIBAT's personnel consists of international marketing professionals and ex-military specialists, who possess an extensive range of operational, technical experience and many years of accumulated Defense & Homeland Security (HLS) knowledge. Organizational structure enables clients to utilize the combined strengths of government and industry vis-a-vis the constantly-changing global marketplace.

Chapter 6. Analysis of Israel's defense industry

Israel has a population of 8.2 million and its land area is 27,770 square meters, similar to the size of North Gyeongsang province in Korea, which is only 20% level of Korea. But defense industry production accounts for 10.5% of the total production of the manufacturing industry. In addition, defense exports account for 14% of the country's total exports, and 80% of defense manufacturing accounts for exports. In addition, the annual R & D expenditure is 4.4% of GDP, while the defense industry accounts for 30% of the R & D budget, maintaining the world's No. 1 level.

As such, Israel's defense industry grew rapidly in 1967 and 1969. When France and the UK imposed an embargo and canceled arms export to Israel, they have to produce their own depend goods. It became a turning point in fostering a government-led defense industry base.

Recognizing the limitations of strengthening military power that relied on existing military cooperation, the government implemented a "self-defense" policy. As a result, weapons systems and systems required by the military is supplied through its own development and procurement policies. At last, defense goods exports to Iran, South Africa, China, Singapore, and Chile steadily increased from the 1970s to the 1980s, contributing to securing national competitiveness and economic growth. However, the reduction of the defense budget, the economic recession that lasted from the mid-1980s to the early 1990s and the government promoted privatization specialized policies to form an autonomous competition structure and improve efficiency for defense companies through a free competition system.

As a result, the business area was steadily expanded through active export market development, high-tech research and development (R & D), and mergers and acquisitions (M&A). Israel's defense industry grew up to a state leading the global defense industry in the 2000s.

Defense industry experts viewed defense R & D system and defense export policy as Israel's defense industry growth background. Based on this, Israel's experience give Korea good example to the direction of development of the defense industry.

Korea can get lots of lessons as benchmark in these suggested areas such as M&A among domestic companies, joint development with foreign companies, establishment of a defense R & D system through niche market targeting, and export market diversification strategies.

Section 1. Israel's defense industry development strategy

Historically Israel's defense industry began in the early 1920s when weapons and ammunition were produced to defend against attacks from Arab countries. In 1933, the first defense company TAAS was established, and since its establishment in 1948. After Israel's independent in 1948, with the Israel Defense Forces(IDF) supports, the Israeli government has integrated domestic manufacturing companies. The government reorganized them into IAI (Israel Aero Space Industries) and IMI (Israel Military Industries).

In addition, Rafael (Rafael Advanced Defense System) was established as a Research and Development (R & D) agency under the Israeli Ministry of Defense, focusing on fulfilling the military's emergency needs, focusing on weapons development and production institutions. Furthermore, the Israel government and the Israel Defense Forces transferred and acquired the world's best French military technology through continuous cooperation with advanced European countries such as France and Germany. These cooperation allowed Israeli defense companies to license high-tech weapons systems and related systems, including French Air carriers.

However, Israel was unable to introduce weapons from advanced countries due to the 3rd Middle East War in 1967 and the Yom Kippur War in 1973. So they had to promote independently the development of fighter jets, ships, tanks, and missiles to get secure defense funds. In particular, several Middle East Wars led to develop aviation reconnaissance, radar, information, communication, and missiles that could identify and respond to enemy attacks in advance. Since that period the foundation for mutual defense cooperation with U.S. was established through cooperation in defense research and development and arms imports using U.S. military aid.

Table 6-1. Development Process of Israel Defense Industry

	The main Contents
1970s	• Self-Defense policy • US military cooperation
1980s ~ 1990s	• Specialization and Diversification • Defense Export Expansion Policy • Choice and Concentration strategy • Qualitative Advantage Policy. • Mergers and Acquisitions (M&A)
2000s	• Business Diversification • Privatization Policy
2010s~	• Defense Export Expansion • Export Markets Diversification • Security Industry Expansion Policy

In recent years, with focusing on developing core technologies and expanding export markets through "Selection and Concentration Policy", Israel has gained an opportunity to have competitive advantage in its defense industry. Due to the global spread of counter-terrorism and strengthening rebel activities, Israel have another chance to develop defense industry.

In addition, we expect that the scope of defense exports will continuously increase. As defense goods exporters, Israel diversified the area to Asia, Africa, and other regions as well as the kinds to conventional and advanced weapon systems.

Section 2. Israel's defense goods export strategy

Israel's basic defend goods export policy is to increase exports mainly through private sector companies. Government only impose minimal government intervention, strong regulations. At last they create a competitive environment in the domestic market, and establishment of a defense industry innovation system. Here, minimal government intervention and strong regulation mean that in the only security related matters, government controlled strictly in exporting defense goods, and in other matters, the government don't involve and guarantee the market as much as possible. This means that the defense industry is directly exposed to the competitive environment to motivate voluntary exports, and the government

establishes a private sector led export system by creating suitable and competitive environment.

In addition, defense industry companies are induced active and voluntary export activation efforts through policies to revitalize competition in the domestic market. It means that the government opens the domestic market itself to the domestic private sector and overseas by actively accepting defense goods from overseas companies. Such a competitive environment encouraged defense companies to develop technologies and export defense goods products, and provided an opportunity to strengthen export competitiveness by improving product quality.

Therefore, Israeli defense companies have conditions to focus on business efficiency through strategic Mergers and Acquisitions (M&A) and Restructuring. It also created a state voluntarily focusing on defense goods exports, leading to Israel's leap the global defense market as an emerging powerful export country.

In addition, the defense goods marketing in export market carried out and is also led by private sector defense companies and indirectly supported by the government.

The defense goods export exclusive organization SIBAT (SIBAT : Foreign Defense Assistance & Defense Export) is belonging to the Ministry of National Defense. It is organized with 'Regional marketing departments' and 'Defense surplus goods sales departments' to promote Israel's defense exports. 'Regional marketing departments' classify the world into three regions (European and North American marketing departments, Asia-Pacific and African marketing departments, and South American) and carry out marketing support activities focusing on customized marketing support activities by region.

In addition, 'the Defense sales department' is contributing to increasing resource utilization and improving export effectiveness by selling surplus materials of Israel defense forces and exporting unnecessary defense supplies to other countries. In particular, in performing G to G (Government to Government) sales, SIBAT plays the role of Israel government in the transaction at the request of the other defense goods import countries. But SIBAT mainly plays an intermediary role between the

other import country. After export are carried out, the other series processes are carried out directly by private sector export company.

Meanwhile, Israel's offset trade system focuses on subcontracting and purchasing products to its own country companies, investing in Israeli companies, and reducing obligations with trading partners.

The transaction amount of defense and non-defense products required by the Israeli government accounts for 50% and 35%. If government procurement agreement is applied, respectively, offset trade is made at 20% of the purchase price.

By implementing the pre-approval system for offset trade, foreign export companies' pre-proposals for offset trade are accepted with consideration the priorities. Using the offset trade banking system, SIBAT support the defense goods export companies to allow implement the amount later even if the offset trade requirements are not enough.

In addition, by supplying the information about technology transfer, analysis of institutional and market trends of other countries, and of company information, SIBAT create business opportunities additionally.

Currently, Israel's defense export companies' financial support is handled by the Ministry of Trade. Israel government helps the export companies to reduce export risk and to provide funds through various government-level systems and guarantee agencies such as The Israel Export Insurance Corporation (ASHRA), Israel Export Institute, and Marketing Investment Fund.

As such, Israel, which is in a tense relationship with neighboring countries, regards the defense industry as a key strategic element of national security and has promoted defense export efficiency as the national strategies. Recently, based on global technology in the fields of unmanned aerial vehicles (UAV), air defense missiles, and sensors, Israel has maintained the world's eighth largest defense goods export country, with about 80% of its total defense goods product exported through the policy of export market preoccupation and diversification.

In particular, under Israel's defense goods export strategy that "all weapon systems must be developed on the premise of export," Israel defense goods industry are emphasized the development, operation, and acquisition of weapons that can be used immediately in practice.

Table 6-2. Direction of Israel's defense export policy

	The main Contents
Marketing	• Collecting and Providing information on the defense market • Support for holding an exhibition • Promotion in connection with the surplus defense goods export
Intergovernmental transactions (G2G)	• Strategic weapon systems and confidential matters • Defense technology cooperation • Government-to-government transaction contract guarantee • Ensure quality and performance
Offset	• Bid Obligation Regulation • Pre-negotiating Applied offset trade system • Offset Banking System
Financial Support	• Minimize emergency risk and credit risk

Section 3. Israel's Defense R & D strategy

Israel's defense R & D policy is focusing on securing the ability to develop advanced weapons systems. Due to the geopolitical security environment, Israel invested heavily in defense R & D from the beginning of its establishment in 1948, and an organization in charge of development under the Ministry of National Defense was established. Israel also support the defense industry to enable its own weapon production and domestic and foreign procurement by establishing state defense companies.

Until the mid-1960s, Israeli defense companies mainly produced rifles and ammunition, and most of the major conventional weapons were imported from Western Europe such as France, Britain, and Germany. However, due to the French embargo in 1967, the Israeli government intensively invested budget and manpower to establish an independent development system for major weapons.

At this time, the Israeli government subdivided and set the standards for domestic development in order to more accurately judge whether or not to develop

domestically.

When a country capable of exporting necessary target weapons refuses to export, the criteria are divided into three standards. First, domestic products had an advantage in terms of required performance. Second, domestic development and production had higher economic effects than overseas purchases import. The last, the necessary target weapon is required for national security, but the export target country is restricted, etc.

In 1977, Binational International R & D Foundation (BIRD) was established to create synergy by combining Israel's technological innovation capabilities with the US commercialization capabilities. In 1979, with US military aid, Israeli aircraft development and defense R & D capabilities increased vary rapidly as a turning point.

Israel began to invest intensively in research on improving the performance of existing weapons systems based on continued U.S. military cooperation, and thus purchased weapons systems platform developed in foreign country and focused on developing technology-intensive weapons systems such as core advanced subsidiaries and software.

In particular, as a result of focusing on the development of electronic warfare, C2, radar, communication, aviation electronic equipment, navigation helmet mounting systems, and electronic optical devices that are integrated into aircraft manufactured by other countries such as the United States and Russia, currently, Israel has the world's best technology in the field of military aerospace.

On the other hand, Israel's special R & D is carried on only very limited areas which is related with core technology and National security by the Director of Defense Research & Development (DDR&D) under the Ministry of Defense, and the actual R & D is carried on by the defense industry companies. Mainly, DDR&D is in charge of basic research, feasibility study, test evaluation, search and development, equipment development, as well as technical evaluation, investigation, and advices on the introduction of new weapons, R & D plan establishment and internal and external technical cooperation related to defense R & D. Industry, academia, and

research institutes are concentrating their capabilities on equipping technological infrastructure that suits their abilities. In particular, concurrently serving as the director of the DDR&D and director of the military R & D, he is focusing on quickly coordinating disagreements between the two organizations, minimizing the decision-making period, and increasing the efficiency of business promotion

In addition, Israel has secured an advantage in product competitiveness in the defense market by strengthening technology by not only directly participating in defense companies from the stage of starting defense R & D projects but also participating in defense R & D projects. Israeli defense companies invest about 7~10% of their total sales in R & D. With these efforts, they are improving the existing defense products system and researching new defense products.

The following 〈Table 6-3〉 shows the directions for major policies in Israel's system development, R & D, and joint R & D. The main feature is that defense companies and private companies participate in the entire process through flexible technology transfer and joint investment to develop advanced and specialized weapon systems.

Table 6-3. Direction of Israel's defense R & D policy

	The main contents
System Developing	• Research on Technology Development for Performance Improvement • Development of advanced technologies focusing on core parts and systems
R & D	• Defense company participation when raising demands • Promotion company-oriented national defense R & D projects • Civil/military technology transfer and horizontal industrial technology policy
Joint R & D	• Weapon system improvement and renovation project • Military education program operation

Furthermore, Israel is inducing world-class military technology innovation through elite military education programs such as Talpiot and Brakim. Through such military programs, a virtuous cycle structure is formed which produces defense innovators and entrepreneurs with highly educated and lots of know-how. With the skills acquired while serving in the military, through defense industry-related activities and venture companies foundation, civil-military technology transfer, joint investment R & D, etc. are contributing to the maintenance and development of

defense capabilities.

Recently, Israel has made international joint development a major weapon system acquisition to secure demand in the international market, enhance high-tech capabilities, and reduce defense spending. In particular, multinational joint research and development projects are being actively carried out to utilize comparative advantage and professional capabilities in the fields of UAV, protection systems, and electronic systems. In addition, Israel together with the United States, its ally, has promoted a number of international joint R & D projects, such as the arrow anti-aircraft missile defense system and the laser intercept system SkyGuard.

While promoting national defense R & D policies with an emphasis on technology acquisition and arms exports rather than domestic demand, the company has secured an advantageous position for exports through international cooperation.

Section 4. Implication from Israel's defense industry policies

Israel and Korea have developed defense industries under similar security environments, but there are some differences in details such as establishing related policies and implementing systems. According to a comparison of Korea's and Israel's R & D defense budgets for the three years from 2012 to 2014, Israel's defense exports are 3.4 times higher, despite its 2.6 times smaller defense R & D budget than South Korea.

In particular, considering that Israel's defense budget is 50% of Korea defense budget and defense R & D budget is 33% of Korea defense R & D budget, it suggests that Israel has a higher level of export-led global competitive defense industry structure with a smaller budget than Korea. In order for the Korean defense industry to take a leap forward and become a developed country in the international defense market like Israel, it is necessary to investigate the main characteristics of Israel's defense industry policy. And we carefully review Korea's economic conditions and technological capabilities and find out differentiated defense industry development strategy

First, Israel defense industry companies are directly in charge of R & D, system development, and are making significant investments in R & D on their own. In fact, Israeli defense companies invest about 7~10% of their total sales in R & D. Along with this R & D development, they are focusing on improving the system of existing defense products or researching new products. This not only provides conditions for defense companies to expand their investments on their own to do their best in technology development, but also provides an opportunity to secure product design and production capabilities at the same time. In particular, the Israel government has adhered to the company-led operation without directly involving in the entire process of technology development, production, and export under the stance of developing the defense industry as national survival strategy. This not only promoted voluntary participation of companies in the international arms market, but also expanded the efficiency and profitability of the domestic defense industry production system to secure competitiveness in the global defense market.

On the other hand, for a long time, defense R & D has been mainly carried out by ADD(the Defense Science Research Institute), and defense companies were mainly in charge of prototype production and mass production. The dualized policy has continued. Recently, Korea is promoting policies in the direction of expanding company-led R & D projects and strengthening the foundation for companies' defense R & D performance. As a result, the level of defense science and technology of domestic defense companies is generally quite low compared to the ADD(Defense Science Research Institute) as well as the world level. Recently, even if domestic defense companies increased R & D investment quite a lot, the amount was not enough to develop industry. In 2017, domestic defense companies' self-investment in defense R & D decreased 8.7% year-on-year to KRW 174.8 billion, which is only 1.5% of defense sales, so the company-led investment activation is insufficient.

Second, Israel is carrying on defense export policy with an emphasis on international arms exports rather than domestic demand. Israel defense company export accounts for nearly 80% of sales on average, indicating that the weapon system is not only developed on the premise of export, but also arms export is carried by the company led export policy and the government's flexible support policy. Defense industry

companies continue to develop high technology weapon and to improve performance, actively accept various forms of demand and technology changes in various countries. They also prepare the mass production, and maintains a consumer-oriented production system that can actively cope with demand fluctuations.

In addition, in the case of domestic military goods procurement, competitive bidding must be made and that market is open to the world. Israel has made the possibility of exporting weapons to the global market a top priority, and technology specialized in defense exports and sales of products are taking place.

However, in Korea, the government-led defense industry developed in earnest from the early 1970s. The government is still leading the development of the defense industry. Domestic defense companies are generating most of their sales mainly in the domestic market without securing global competitiveness to enter the global market.

According to the results of studies by the Defense Acquisition Program Administration (2017) and the Korea Institute of Industries (2018), the proportion of exports to the gross domestic defense industry was only 13% as of 2013 and 13.6% in 2016. This indicates that the domestic production structure continues to hinder the revitalization of defense exports.

Third, Israel has the practical government support system related to defense exports. Although it officially expresses that exports are under the jurisdiction of the company, there are lots of practical government level supports such as market research, discovery of export opportunities, comprehensive defense cooperation, export finance, and technology fee exemption. These supports and operating security supervisory systems under the Export Control Bureau and the Military Security Bureau play a central role in defense export control to target niche markets, select strategic items, and prepare for security-related issues. In addition, it serves as a hub between ministries as well as practice to support defense exports through SIBAT.

Besides, SIBAT is in charge of selling surplus military goods new or old by the Israeli

Defense Force along with marketing support for defense exports. In particular, it has established an export system for surplus and excess inventory goods to flexibly respond to defense demand and strategically maintain friendly relations with other countries.

Korea can be evaluated as having a formal framework for organizations and systems for defense export support at the current government level. But it is doubt that whether the support is sufficient and whether it has a practical effect. This is not support as long-term strategy and planning, but rather ad hoc response when issues arise. There is a problem in efficiency due to the diversification of related institutions and organizations.

In particular, organizational supplementation is needed for support major tasks and functions, such as selecting defense export strategic items, establishing an intensive support strategy, providing financial support to promote defense exports, and promoting joint export marketing by the government, military, development agencies, and defense industry companies. At the same time, as a strategic means to increase the market share of the existing market, it is necessary to supplement the support system to diversify not only finished products but also export items such as surplus equipment for repairs.

Fourth, Israel recognizes the importance of both civil and military dual technologies at the government level. They try to cooperate civil and military dual technology exchange projects with an emphasis on developing weapons systems compatible with the civil and military sectors. In particular, through the conscription system and reserve army system, all citizens fulfill their obligations, duty of national defense. A national innovation system emphasized on the defense industry has been created in which the military and the private sector and the military and industry continuously interact.

Defense company engineers are actively participating in actual battles in case of emergency as a reserve force while working. At that time, they not only understands the needs of operators, but also actively participates in improving the performance of current weapon systems and developing new products. Through the government's

Yozma program and MEIMAD program, the joint investment R & D system of government related ministries as well as military ministries is activated, creating new opportunities and improving efficiency. In addition, through elite military education programs such as Talpiot and Brakim, excellent human resources are cultivated and educated, they are playing a role in driving the transfer and commercialization of technologies between civil and military in the future.

Through mutual R & D cooperation between the military and the civilian sector, the technology developed by the private sector is effectively applied to the defense industry and used by the Israeli military. It also gives the opportunity to develop various defense products, and to secure its own external technology competitiveness.

On the other hand, Korea maintains an R & D system led by ADD, government defense research institutes. Due to the development of single products that rely on military demand and Requirement of Operational Capability (ROC), the effect of continuous learning and technology transfer is insufficient. Comparing to Israel, and active civil-military technology cooperation by government related ministries and private companies is also insufficient.

Finally, Israel is in charge of finance, R & D, procurement, and management to support the military's defense acquisition by strengthening the Ministry of Defense's ability to control defense R & D policies and coordination. While taking charge of related bidding, contract management, and investment, the R & D department director of the Ministry of National Defense has the authority to establish and implement almost all R & D policies.

Therefore, unlike Korea, the R & D department is in charge of overall defense R&D, such as reviewing the needs of each military and suggesting R&D directions.

However, Korea's defense R & D has been mainly developed by strengthening the military's power against threats, rather than intensively by fostering core technologies, basic and source technologies. Major weapon systems was introduced at first abroad and defense R & D projects was conducted in a short period of time.

In addition, the linkage between requirement and R & D was insufficient, such as

developing R & D as part of the acquisition after the Requirement decision. From the Ministry of National Defense point of view, it can be said that the role of policy establishment and control tower is not efficiently combined, operate each element is insufficient, and the related functions are also limited. These are shown in 〈Table 6-4〉 below.

Table 6-4. Comparison between Israel and Korea's defense industry

	Israel	Korea
R & D host	• Defense company	• Agency for Defense Development (**ADD** : Defense Science Research Institute)
Production structure	• Foreign demand (export)	• Domestic demand
Support system	• Unified **system**	• Diversified **system**
Technology cooperation	• Joint development of civil, military, and related ministries.	• Led by a research institute for national defense (ADD).
Project promotion procedure	• The Ministry of National Defense and defense companies participated in the entire process.	• On raising the requirements, defense companies did not participate. • Lack of long-term R & D policies and business control of the Ministry of National Defense.

Section 5. Korea's defense industry development ways

In the previous chapter, implications and lessons were drawn based on the case of Israel, an advanced country in the defense industry. In this Section, I would like to give an overview of how this Israeli case can be applied compared to the current defense industry of Korea.

1. Selecting the high potential areas considering the national defense

Which field is selected in defense industry is a matter of choice and priority. Considering national security situation and national capabilities in Korea to maintain military power in wartime and peacetime. Considering the urgency of national security and availability from foreign countries, defense capabilities can be divided into three categories: strategic capability, core capability, and preferred capability.

First, strategic capability has a significant impact on our national security, so it

has to be acquired as soon as possible regardless of economic feasibility. For example, technology to protect nuclear weapons, advanced encryption technology required for our military's independent operations etc. belong to this ability.

Second, the core capability is the capability that our military must maintain and develop, and the defense capability related to the continuous supply in wartime. If this capability is dependent on foreign countries, it is difficult to obtain weapon systems in necessary period and to reflect our needs, so we will be badly affected by the monopoly of foreign supplier to be damaged.

Finally, the preferred capability can be procured from the international market as a national defense capability. If possessed as a domestic defense capability, it can be a defense capability that contributes to the construction and maintenance of military power and also to the national economy.

First of all, once high potential areas of defense industry in Korea is selected, priorities orders has to be determined, the Joint Chiefs of Staff makes an action plan for selecting area, and at last the Ministry of National Defense should make the final decision. To proceed these process, at first, each military units and JCS receives information on the defense industry base from the Defense Acquisition Program Administration(DAPA). And next, they identify the defense industry and technological base that must be acquired to build and maintain current and future power.

2. Sufficient initial investment support reflecting the starting point

The defense industry scope to start can be determined when the acquisition budget reflected. Based on defense companies' offered price and cost-benefit analysis, a proper budget to support starting defense industry companies should be secured.

Whether or not the defense acquisition plan is accepted is actually determined by prior research and mid-term budget formation. If the prepared budget is not reflected in a timely manner, the participation scope of the defense industry companies is bound to be reduced. Generally the defense industry companies make

an investment in advance, take financial risks, which can adversely affect the cash flow of the defense industry. Therefore, the appropriate level of defense acquisition budget must be reflected so that the defense industry can participate in the project in a planned and stable manner.

Up to now, most R & D projects have been driven by the burden of increased development costs and a tight development period, so even for items that can be developed locally, foreign parts have been imported. Moreover, after the R & D project is completed, there are cases where localization development itself is technically difficult. Even though localized development is successful, economic feasibility is lost only with the small amount quantity required in the operation and maintenance.

Therefore, for the actual localization of parts, localization should be carried out from the R&D stage.

The government and the Defense Acquisition Program Administration(DAPA) Integrated Project Management Team, which manages the acquisition project, from the stage of prior research, should actively accept domestic parts suppliers' localization proposals.

In addition, defense goods parts suppliers should be selected with understanding the domestic and foreign supply structure for major parts, expanding the scope of localization development in the future and considering the efficiency of future logistics support.

3. The government's R & D support and cooperation with private sector

To promote a national challenge 'New economic growth engine of defense industry', the defense R & D budget out of the total R & D budget of the government should be additionally expanded or the R & D budget of other government ministries should be stably transferred into defense R & D.

Without increased investment in defense R & D, it is difficult for the defense industry to derive national economic growth. However, in reality, there is a conflicting

relationship between R & D expansion and promotion of new or existing power investment projects, because defense R & D expenses are organized as part of the defense capability improvement budget.

On the other hand, defense R&D has a characteristic that is directly related to defense procurement on the premise of commercialization, and thus has greater tangible results than R&D projects of other government ministries that develop technologies prior to commercialization. Due to of this characteristic of the defense R & D project, which develops technology on the premise of acquiring specific equipment, other government ministries jointly invest in R&D projects in the defense field and cooperation is in progress.

The ongoing Joint national projects of Ministry of Defense and Ministry of Commerce, Helicopter Project, information and communication technology development in the defense areas are good examples.

Under these circumstances, in order to continue the upward trend of defense exports and to allow the defense industry to play a role as new economic growth engine, the government must establish an additional budget to develop technologies related to defense R & D projects or other defense acquisition projects. It should be used to create added value. In addition, the budget for the ongoing civil-military cooperative R & D project with the Ministry of National Defense should be supported stably.

4. The foundation of government and the company's joint export support organizations

On exporting the defense goods, the most of consumers are the government or military-related organizations of the import country. So there are lots of restrictions in establishing and implementing effective export marketing only with the efforts of private companies.

For this reason, the developed country the governments in defense industry such as the United States, Britain, France, Israel have established an export support organization to actively support the defense exports companies. To establish an

organization specializing in defense export support similar to that of foreign countries is needed.

In this regard, the following should be considered.

For direct export of defense companies and higher level support for private export trade organizations, military cooperation at the Ministry of National Defense, the Joint Chiefs of Staff and each military level, and defense industry and logistics cooperation should be organically linked. It is necessary to support education and training connecting to the export of equipment, and to actively support each military for the transfer and sale of culling and surplus equipment. Support for professional R & D personnel including the ADD (National Defense Science Research Institute) should also be provided.

In order to carry out these missions more efficiently, a government organization that is differentiated from private export companies, but managed like a private company.is needed to dedicate to defense exports. This organization establishes defense export policies, permits and controls defense exports, investigate export markets by countries, establishes marketing strategies, cooperates with defense technologies by countries. It is also in charge of exporting government culling surplus equipment, parts, trade-offs, comprehensive contact point with domestic and foreign companies.

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