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# The Revolution in Military Affairs and the Defence Industry in South Korea

Chung-in Moon and Jin-Young Lee

South Korea set about establishing an indigenous defence industry in the 1970s. By the late 1980s, a series of overseas and domestic developments moved the focus of South Korean defence industry beyond licensed production of US-designed conventional weapons to the requirements of military modernisation, including command and control. By the late 1990s, South Korea's military modernisation had begun to assume many of the characteristics of the Revolution in Military Affairs (RMA) pioneered in the United States and had begun to affect profound changes in the nation's defence industry and associated defence exports.

South Korea experienced the devastating trauma of the Korean War during 1950-1953, but security dependence on the United States and economic underdevelopment prevented South Korea from seeking a viable defence industry at that time. However, a changing security environment forced South Korea to embark on the creation of its own defence industry in the late 1960s. President Richard Nixon announced the Guam Doctrine in 1969. This Doctrine not only stipulated a gradual disengagement of the United States from Asia, but also called for 'an Asian defence by Asians'. As a result, US security commitment to South Korea visibly weakened, with a major reduction of its troop presence. Alarming, the erosion of US security commitment coincided with North Korea's increasing military provocation, with North Korean commandos attacking the presidential mansion in Seoul on 21 January 1968, which was followed by the capture of Pueblo, an American naval intelligence ship in the East China Sea.

It was in this context that Seoul decided to move towards indigenous defence industrialisation. Since South Korea did not have an industrial structure conducive to defence industrialisation, its earlier efforts concentrated on the production of ammunition and small arms—such as rifles and light machine guns—with the assistance of US technical data packages and manufacturing license agreements. Starting from 1974, however, South Korea undertook massive and systematic defence industrialisation. It established a heavy-chemical industry expressly for defence purposes. As a result of this concerted push, South Korea was able to satisfy most of its conventional weapons requirements by the mid-1980s.

From the late 1980s, South Korea encountered new internal and external changes. The end of the Cold War, realignment of American security posture in East Asia, and South Korea's democratic transition paved the way

for a new discourse on military strategy, construction of military power, force structure and weapons systems. But the new discourse was confined mostly to military modernisation rather than Revolution in Military Affairs (RMA). South Korea's interests in RMA became more pronounced only after the late 1990s, profoundly affecting the nature of the defence sector in general and the defence industry in particular. With these evolutionary dynamics in mind, the article aims at elucidating the application of RMA in South Korea and tracing its impacts on procurement needs, acquisition types and the defence industry.<sup>1</sup> The first part of the article explores how the concept and practice of RMA have evolved in South Korea, while the second part examines how RMA has affected procurement needs in South Korea's defence sector. The third analyses impacts of RMA on the acquisition patterns by source (i.e., domestic research and development (R&D), licensed and co-production, direct foreign acquisition) and by armed services. Finally, the article looks into how introduction of RMA has influenced the development of the defence industry and defence exports in South Korea.

### **RMA and its Application in South Korea**

The RMA refers to the introduction and implementation of new thinking concerning strategy and tactics, military organisation and doctrines, force structure and overall weapons acquisition.<sup>2</sup> As Richard O. Hundley aptly points out, a RMA involves a major paradigm shift in the nature and conduct of military operations, which results from the combination of multiple innovations in technology, device, system, operational concept, and military doctrine and force structure. In a narrow sense, it is predicated on major innovations in sensor (reconnaissance and surveillance), C4I (Command, Control, Communication, Computing and Intelligence), shooter, and networks, assuming network-centric warfare as the core of future wars.<sup>3</sup> In a broad sense, RMA, as evidenced by the experience of US military transformation strategy, presupposes major changes in technology, processes, organisation and people of the defence sector in order to meet new security challenges.<sup>4</sup>

Several factors have facilitated the advent of RMA in the United States and elsewhere. The first is changes in the overall security environment following the end of the Cold War and globalisation. Different types of military force

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<sup>1</sup> In South Korea, Revolution in Military Affairs (RMA) is translated as *hyockshin* (innovation) in military affairs. We have followed the same translation.

<sup>2</sup> See Thierry Gongora and Harald von Riekhoff (eds), *Toward a Revolution in Military Affairs?: Defense and Security at the Dawn of the Twenty-First Century* (Westport, CT: Greenwood Press, 2000); Colin S. Gray, *Strategy for Chaos: Revolutions in Military Affairs and The Evidence of History* (London: Frank Cass, 2004). RMA is also cast in a broader context of transformation. See Office of the Secretary of Defense, *Military Transformation: A Strategic Approach* (Washington, D.C.: US Department of Defense, Fall 2003).

<sup>3</sup> William A. Owens, 'The Emerging System of Systems', *US Naval Institute Proceeding*, vol. 121, no. 5 (1995), pp.36-9.

<sup>4</sup> Office of the Secretary of Defense, *Military Transformation: A Strategic Approach*, p. 11.

are required to respond effectively in an emerging international order in which threats stem less from nation-states and more from non-traditional actors such as global terrorists. RMA can thus be seen as an organisational response to changing security environment.<sup>5</sup> The second factor is technological change and its impact on military affairs. As American military performance in the 1991 Gulf War, air raids in Kosovo and most recently in the invasion of Iraq have demonstrated, the evolution of weapons technology, especially the revolution in information technology, has brought about profound changes in military organisation and doctrine. In addition to network-centric warfare related assets (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance—C4ISR),<sup>6</sup> the availability of such sophisticated technologies as UAVs (Unmanned Aerial Vehicles), nanotechnology, robotics, and biotechnology furthered technology-driven RMA. Finally, in so much as new technology and new social and organisational arrangements have shaped the nature of RMA, new strategic thinking about the use of force, the conception of war and method of winning war has been equally critical. Precision strike, as opposed to mass destruction, and the mandate of minimal human casualties including soldiers have justified the adoption of RMA.<sup>7</sup>

Central to RMA, especially in the American context, is the transition from platform-centric to network-centric operations. And its effective pursuit is expected to bring about several positive dividends: increased speed of command, self-synchronisation, advanced targeting, greater tactical stability and eventually assuring victory in new security environment. Vice Admiral Arthur K. Cebrowski, who headed the Office of Force Transformation in the Office of the Secretary of Defense, summarised the benefits of Network-Centric Warfare (NCW) in the following manner:

NCW will provide increasing return on investment by providing our most important resource- our people- the high quality shared awareness necessary to speed mission accomplishment. NCW capabilities will accelerate our ability to know, to decide, and to act ... NCW is at the heart of military adaptivity- the ability to respond to uncertainty in dynamic situation, day-to-day, at every level of warfare, and across the range of potential military operations.<sup>8</sup>

South Korea has not formally adopted RMA as an official doctrine, but has been constantly pursuing innovation in military organisation, doctrine and weapons systems since the early 1970s within the framework of military

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<sup>5</sup> Sean A. Edwards, *Swarming on the Battlefield: Past, Present, and Future* (Palo Alto, CA: RAND Research, 2000).

<sup>6</sup> Thomas P. Barnett, *The Pentagon's New Map: War and Peace in the Twenty-First Century* (New York & London: Penguin, 2004).

<sup>7</sup> Patrick M. Morgan, 'The impact of the revolution in military affairs', *Journal of Strategic Studies*, vol. 23, no. 1 (March 2000), pp. 134-5.

<sup>8</sup> Office of the Secretary of Defense, *Military Transformation: A Strategic Approach*, p. 13.

modernisation. Until the mid-1990s, military innovation in South Korea had generally entailed reactive adjustments to changes in the security environment. It may not be exaggerating to regard President Park Chung-hee, who ruled South Korea from 1961 to 1979, as the pioneer of South Korea's version of the RMA. Facing eroding US security commitment and North Korea's military provocation, Park sought an answer in military modernisation through an indigenous defence industrialisation. In order to expedite defence industrialisation, President Park undertook sweeping measures. The Special Law on the Promotion of the Defense Industry was enacted in 1974 to provide a legal foundation for the enhancement of the defence industrial sector through a wide range of incentives such as preferential financial arrangements, tax and tariff reduction, concession of plant sites, and other administrative support. The National Investment Fund was set up in 1974 as a way of mobilising financial resources for heavy-chemical industrialisation, which was later transformed into the Defense Industrial Promotion Fund (DIPF) in 1980 to direct financial resources toward the defence industry. The DIPF was abolished in 2006. Even defence contractors were designated by the government, and a more comprehensive research and development infrastructure became available through the creation of the Agency for Defense Development (ADD) in 1970. Starting with an ammunition and M-16 rifle plant in the late 1960s, defence contractors began to proliferate throughout the 1970s. During this period, major emphasis was given to simple assembly and production under licensing agreements of ammunition and basic infantry weapons. From 1977 to 1984, contractors focused on product development through modification, redesign, and reproduction via reverse engineering.<sup>9</sup> As a result of this initiative, the South Korean military was able to smooth out its force modernisation. Although the South Korean military could enhance the hardware aspect of its capabilities through the modernisation, its overall strategy, force structure and doctrine remained untouched because of its dependence on the US forces in South Korea.

The second move took place during the Roh Tae-woo government (1988-1992). New innovations in military affairs during this period can be attributed to two factors. One factor was further changes in the international security environment. German unification, the demise of the Soviet Union and the end of the Cold War entailed profound changes in American security commitment to South Korea. US Congress passed the Nunn-Warner Amendment in August 1988, which mandated the three-phase reduction of forward deployed American forces in East Asia. American forces in South Korea were also subject to a phased reduction. The other factor was South Korea's transition to democracy. The year 1987 marked a historic political shift in South Korea, ending a long authoritarian military rule and opening a

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<sup>9</sup> Chung-In Moon, 'The political economy of defense industrialization in South Korea: constraints, opportunities, and prospects', *The Journal of East Asian Affairs*, vol. 5, no. 2 (Fall 1991), pp. 440-1.

new era of democratic governance. Roh, a co-leader of the military coup in 1979 along with Chun Doo-hwan, ran for presidential election, and his campaign platform was focused on an increased self-reliance in defence as a way of winning public support. Upon his election, President Roh proposed a new slogan of “Koreanization of Korean defense”, signalling a departure from the excessive dependence on the United States.

As part of its new defence policy, the Roh Tae-woo government announced a “development of a long-term defense posture plan” on 18 August 1988, which is often referred to as “the August 18 plan”. The plan set three major objectives: (1) the establishment of a more self-reliant military strategy for national survival, prosperity and Korean unification; (2) construction of military power corresponding to the goal of a self-reliant defence strategy; (3) development of a force structure that not only enhances combat readiness, but also assures a balanced development of the armed services. In order to carry out these tasks, several measures were undertaken. First, the Joint Chief of Staff (JCS) system was introduced, which allowed its chairman to control each armed service. Second, military strategy was realigned to enhance both deterrence capability and retaliatory capability in case of an all out attack by North Korea. Finally, with regard to force structure and weapons procurement, greater attention was paid to a developing a balanced portfolio of highly advanced but expensive weapons and more conventional but moderately priced weapons as well as the strengthening of air force and navy assets as a way of filling the gap that would occur as a result of reduction of American forces in South Korea.<sup>10</sup>

Although the Roh Tae-woo government's push for defence reform fell far short of meeting the requirements of a RMA, the August 18 plan set a new standard and direction of innovation in the South Korea's defence sector. On 25 February 1993, the Kim Young-sam government (1993-1998) was inaugurated, but it chose not to continue Roh's policy. President Kim regarded the Roh government as a continuation of the military regime, and undertook measures to civilianise the military, that included the dissolution of the *Hanahoe*, the dominant faction in the Korean military. Accordingly, the Kim Government's primary goal was de-politicising the South Korean military and it accorded lower priority to innovation in military strategy, force structure and new weapons systems.

A more systematic introduction and implementation of RMA occurred with the advent of the Kim Dae-jung government (1998-2003). On 15 April 1998, immediately after inauguration, the Kim Dae-jung government launched the Committee for the Promotion of Defense Reform and established the Five-Year Defense Reform Plan. In order to vigorously execute the plan, the Committee set up the Planning Unit for Military Innovation and identified

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<sup>10</sup> Institute of Defense and Military Studies *Gukbang Jeongchaick Byuncheonsa* (History of Defense Policy) 1945-1994 (Seoul: Institute of Defense and Military Studies, 1995), pp. 312-8.

three goals: (1) creation of the most capable standing army; (2) expansion of an information technology-intensive military armed with cutting-edge weapons; (3) construction of a rational, effective and economical military.<sup>11</sup> The Kim Dae-jung government introduced several initiatives in order to realise these goals. First, it pushed for organisational reforms by creating new unified national command systems in the fields of transportation and bio-chemical and nuclear defence as well as improving acquisition systems in JCS. Second, a greater emphasis was placed on the informatisation of the defence sector. Finally, the Kim government began to expedite the acquisition of defence assets closely related to network-centric warfare and surveillance and strike capabilities, while the army, the navy and the air force began concurrently to acquire future-oriented, cutting-edge weapons systems.<sup>12</sup> The diffusion of the US model of RMA began to dominate Kim government's thinking on military affairs.

The Roh Moo-hyun government, inaugurated in February 2003, went further. On 1 June 2005, the Roh government established the Committee on Defense Reform, which drafted the "Defense Reform 2020" plan. The "Defense Reform 2020" plan aims at assuring a self-reliant advanced national defence through the creation of a technology-intensive military structure and future-oriented defence capability. Two factors affected the nature and direction of the "Defense Reform 2020" plan. One was the return of wartime operational control from the United States to South Korea, and the other was South Korea's improved science and technology capabilities. Whereas the former emphasised an aspect of 'independence' or 'self-reliance', the latter underscored a new direction of defence reform framed around speed, stealth, accuracy and networks. Four major tasks have been identified in order to carry out the plan. They are: (1) securing military structure and defence capabilities corresponding to contemporary warfare; (2) expanding the role of civilians in the defence establishment; (3) innovation for a low cost/high efficiency national defence management system congruent with a cutting-edge information-intensive military; (4) improvement of soldiers' military barrack life.<sup>13</sup>

The hallmark of Defense Reform 2020 was the qualitative transformation of the South Korean military. It aimed at reducing the current number of armed forces from 650 000 to 500 000 by 2020, while giving priority to the introduction of a new capital- and technology-intensive military structure. The army was the primary loser from the reform in the sense that it had to find most of the manpower reduction. Nevertheless, its combat capabilities were expected to improve considerably with the acquisition of Unmanned

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<sup>11</sup> The Ministry of National Defense (MND), *Gukbang Jeongchaik* (National Defense Policy) 1998-2002 (Seoul: MND, 2002), pp. 25-31.

<sup>12</sup> *Ibid.*, pp. 39-46.

<sup>13</sup> See MND, *Gukbang baeksoh 2006* (The National Defense White Paper 2006) (Seoul: MND, 2006), pp. 36-7; MND, *Gukbang gaehyuck 2020 irukke chujinhabnida* (Implementation of Defense Reform 2020) (Seoul: MND, 2006).

Aerial Vehicles (UAV) for reconnaissance, next generation tanks and infantry fighting vehicles, improved fire systems, and a simplified command structure. The navy and the air force were the plan's principal beneficiaries. The navy would be able to go beyond a coastal navy by securing both a submarine command and a naval air command. The air force could enhance its combat readiness by acquiring next generation fighters (F-15K), surface-to-air missiles (SAM-X), and airborne early warning systems (E-X). The most crucial aspect of the plan was the massive investment in battle management assets focusing on C4ISR, all of which are essential for network-centric warfare. Along with this, the Defense Reform 2020 has mandated the acquisition of theatre operational command facilities, military communication satellites, tactical information communication networks (TICN), the Joint Tactical Data Link System (JTDLs), and the Korea Joint Command and Control system (KJCCS).<sup>14</sup>

In summary, RMA in South Korea is a relatively recent phenomenon, deeply influenced by the diffusion of the American RMA concept and practice. Compared with that of the United States, however, the scope, depth and rate of South Korea's defence transformation in the direction of RMA seems rather limited. Nevertheless, an increased military self-reliance, a diminished dependence on the United States, and improvements in indigenous science and technological capabilities have facilitated its pursuit of a revolution in military affairs.

### **RMA in South Korea by Procurement Needs**

How has the introduction of RMA affected the pattern of defence procurement needs in South Korea? During the 1970s and 1980s South Korea's defence procurement needs were framed mostly around conventional weaponry (see Table 1). They included small arms, short-range artillery pieces, ammunition, rudimentary communication equipment, Hughes 500MD helicopters, F-5 E/F fighters, relatively small scale naval vessels (battleships, patrol ships and destroyers), short-and medium-range missiles (Nike Hercules SSMS, Honest John unguided tactical missiles and Hyunmoo medium range guided missiles), and armoured vehicles (US M48 (Tank), M-113 Tank, ROKIT ('88 Tank), K-2000 APC and K900 APC). Very little attention was given to assets related to RMA, a situation exacerbated by the South Korean military's excessive dependence on American C4IRS assets within the framework of the Republic of Korea (ROK)-US Combined Forces Command (CFC). The South Korean military was also relying on American forces for tactical data link system, tactical information communication networks, and tactical command system.<sup>15</sup>

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<sup>14</sup> MND, *Implementation of Defense Reform 2020*.

<sup>15</sup> Yong-sam Kim, 'Hankukui GUNSA Hyokshingwa C4I Cheje Baljon Banghyang' (RMA in Korea and Direction for Development of C4I System), *Gukbang Yongu*, vol. 50, no. 2 (December 2007), p. 106.

**Table 1: Major Defence Articles Produced in Korea (1970s-1980s)**

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

Source: The Defense Procurement Agency, *Korea Military Supplies*, (Seoul: MND, 1987).

Table 2 presents data on the acquisition pattern of major defence articles between 1999 and 2004. RMA began to draw the attention of South Korea's defence planners, and C4ISR emerged as one of top priorities in budget allocation. During this period, the army, navy, and air force have acquired C4I system, and transformed their communication network system from analogue to digital mode by introducing the Spider network system.<sup>16</sup> Consequently, both individual and joint battle management of armed services have greatly improved. The army's acquisition has focused mostly on improving its mobility (e.g., K1A1 tank, K-9 self-propelled howitzer),

<sup>16</sup>On the Spider network system, see Samsung Thales Homepage, <<http://kor.samsungthales.com/DefenseSolution/?Pcode=kor02020202&SubNum=1>> [Accessed November 2008]

firepower (e.g., MLRS, ATACMS, short-range surface to air missiles such as Chunma, Biho, and Shingung), and reconnaissance and surveillance (e.g., UAV, BO-105 small reconnaissance helicopter). The air force has also begun to obtain next generation fighters, the F-15K, surface-to-air missiles (PAC-2), and advanced missiles (e.g., Harpy, AIM-120). Its tactical intelligence (both imagery and signal) capabilities have also significantly improved through the acquisition of 10 Hawker-800 and related collection equipment.<sup>17</sup> The navy has been active in enhancing combat capabilities through the acquisition of next generation destroyers (e.g., AEGIS) and submarine assets.

**Table 2: Major Defence Article Acquisitions 1999-2004**

	1999-2000	2001-2002	2003-2004
<i>C4ISR</i>	Army C4I System, TPS-830K (1), Sea Surveillance Radar	2nd MCRC (2), Hawker-800	Air-Force C4I System, Navy C4I System, SPIDER (3), KJCCS (start)
<i>Army</i>	K-9 (4), K-77 (5), AN/TPQ-37, Searcher (UAV), BO-105 (Small reconnaissance helicopter)	KRQ-110 (UAV), Portable RADAR (start), K-9, K1A1	K1A1, K-9, MLRS, ATACMS, Chunma (SAM), Biho (AAA), Singung (6)
<i>Air Force</i>	KF-16, HARPY, AIM-120	F-15K (launched), SAM-X (launched), KF-16	KF-16
<i>Navy</i>	LST, KSS-1, KSS-2 (start), LYNX, ISAR (P3-C), LPX (landing platform) (start), Harpoon, K731 (8), KAAV (8)	KDX-III (launched), KDX-II (Destroyer)	KDX-II , FFX (9) (launched)

(1) Low Altitude Surveillance Radar, (2) Master Control and Reporting Center, (3) Tactical Communication System, (4) Self-Propelled Howitzer, (5) Fire Direction Center Vehicle, (6) Portable Short-range Surface-to-Air Missile, (7) Heavy Weight Torpedo, (8) KAAV: Korea Assault Amphibious Vehicle, (9) Next-Generation Frigate. Source: The National Defense White Paper 1999, 2000, 2004, 2006.

Major procurement needs during 2005-2020 are summarised in Table 3. Defence articles listed here constitute the core of acquisitions mandated by the Defense Reform 2020 plan. Emphasis has again been placed on improvement of individual and joint C4IRS capabilities of the armed services. Acquisition of military communication and surveillance satellites deserves

<sup>17</sup> *Hankuk Ilbo* (5 May 2000).

attention, along with the decision to purchase Airborne Warning and Control System (AWACS), high altitude UAVs, Joint Tactical Data Link System (JTDLs), and Tactical Information Communication Network (TICN). The army has focused on mobility (NIVF, next generation tank (XK-2) and attack helicopters (KHP)) and firepower (KM-SAM). The air force will continue to upgrade its fighting capability through the acquisition of F-15Ks, FA-50s, SAM-X, and a wide array of airborne missiles, including Joint Air to Surface Standoff Missiles. The navy acquired the first AEGIS destroyer in 2007 and will continue to upgrade its combat capability by securing KDX-3 (7 000 ton AEGIS class destroyers) and middle-sized submarines (1 800 ton-class).

**Table 3: Major Defence Article Acquisitions During 2005-2020**

	2005–2007(acquired)	2008–2020 (planned)
C4ISR	Army, Navy and Air Force C4I Military Communication Satellite	AWACS, High Altitude UAV, Surveillance satellite, JTDLs, TICN
Army	K1A1 Tank, K-9	Firefinder RADAR, KHP, NIVF, XK-2 (1), KM-SAM
Air Force	F-15K, KO-1, T-50, ALQ-X	KF-16 Software upgrade, AIM-120, AIM-9M, AGM-65D, AGM-65G, JDAM, GBU-24, GBU-28, PAC-2, KFX, FA-50
Navy	KDX-II, KDX-III, KSS-II, LPX, P-3C (Upgrade), K-745 (2), Haesung-I (3)	KDX-II, KDX-III, KSS-II, KSS-III, P-3C (Upgrade), LST-II, KAAV, FFX

(1) Next Generation Battle Tank (2) Light Weight Torpedo (3) Ship to Ship Missile. Source: *The National Defense White Paper* 1999, 2000, 2004, 2006; DAPA (The Defense Acquisition Program Administration), *Plan for Major Project 2007*, pp. 37-63.

The above examination reveals that RMA considerations have become a key factor in determining procurement needs. Defence assets related to sensor, C4IRS, shooter and networks have increasingly drawn attention from defence planners. The South Korean government anticipates that by 2020, the year when its defence reform is completed, it would achieve a considerable level of self-sufficient intelligence collection capabilities, the construction of real time, synchronised networks among all the units involving battle sensor, command/ control, and force operation, acquisition of strike forces aiming at strategic targets such as weapons of mass destruction, and overall improvement of combat forces by replacing aging weapons and equipment. All this suggests that the RMA is likely to continue shaping future South Korean defence procurement. Nevertheless, the newly inaugurated Lee Myung-Bak government has queried the budgetary feasibility of the procurement plan integral to Defense Reform 2020, and is entertaining the possibility of attenuating the procurement period all the way to 2025

## RMA and Acquisition Pattern by Source

Arms acquisition usually takes place through one of the following four sources: domestic R&D, co-production or production through technology transfer, licensed production and direct overseas acquisition.<sup>18</sup> Given that RMA involves mostly cutting-edge technologies, most countries rely on direct overseas acquisition rather than on domestic R&D or co-production. What is the case in South Korean?

As data in Table 4 show, South Korea has acquired most of RMA-related defence articles through domestic research and development. A large portion of C4I as well as JTDLS and TICN has been procured through domestic sources. Acquisition of advanced armoured vehicles, precision guidance missiles, UAVs, and naval and air assets was also made through domestic R&D. This can be attributed to not only an assertive government policy that encourages domestic procurement of RMA-related assets, but also its improved industrial capabilities in the areas of information technology, heavy machinery and shipbuilding, mobile vehicles and aerospace technology.

**Table 4: Major Defence Articles by Acquisition Source**

	1999–2004	2005–2020
<i>Domestic R&amp;D</i>	SPIDER Army, Navy, Airforce C4I, TPS-830K, K-9, K1A1, K-77, Chun-Ma, Bi-Ho, Shin-Gung, KRQ- 110 (UAV), LPX, KDX-II, LST KT-1	JTDLS, TICN, Army, Navy, Airforce C4I KJCCS, K1A1, K-9, NIFV, Haesung-I, KDX-III, FFX, KFX, KO-1, ALQ-X, XK-2
<i>Co-production or production via technology transfer</i>	ATACMS, BO-105, KSS-I, KSS-II, K731, K745, KAAV	T-50, FA-50, KM-SAM, P-3C (Upgrade), KHP
<i>Licensed production</i>	KF-16	
<i>Direct overseas Acquisition</i>	Search (UAV), Hawker-800, MLRS, HARPY, AIM-120, Harpoon, LYNX, ISAR (P-3C)	AWACS, Firefinder RADAR, Aerial Tanker, High ALT. UAV, PAC-2, F-15K, KF-16 Software Upgrade, AIM-120, AIM-9M, AGM-65D, AGM-65G, JDAM, GBU-24, GBU-28

Source: *The National Defense White Paper* 1999, 2000, 2004, 2006; DAPA (The Defense Acquisition Program Administration), *Plan for Major Project 2007*; MND, *National Defense Policy 1998-2002*.

<sup>18</sup> Andrew L. Ross, 'Arms acquisition and National security: The Irony of Military Strength', in Edward Azar and Chung-In Moon (eds), *Third World National Security* (London: Edward Elgar Press, 1988), pp. 153-66.

ATACMS, KSS-I, BO-105, KSS-II, K731, K745, and KAAV have already been acquired through co-production or production through technology transfer during 1999-2004, whereas T-50, FA-50, KM-SAM, P-3C (Upgrade), and KHP will be procured through co-production during 2005-2020. Meanwhile, licensed production is limited only to F-16. Search (UAV), Hawker-800, MLRS, HARPY, AIM-120, Harpoon, LYNX, and ISAR (P-3C) have been obtained through overseas direct acquisition during 1999-2004, and big-ticket items such as AWACS (four Boeing 737s), Firefinder RADAR, Aerial Tanker, High Altitude UAV, PAC-2, F-15K, KF-16 Software Upgrade, and precision guidance missiles (AGM-65D, AGM-65G, JDAM, GBU-24, GBU-28) are slated for acquisition through foreign sources. In addition, the South Korean government is exploring the possibility of acquiring Global Hawk from the United States.

The acquisition pattern of defence articles by armed services shows several interesting trends (see Table 5). With respect to joint operation assets such as C4IRS, software has been mostly acquired or is planned to be acquired through domestic research and development, whereas hardware such as AWACS and high altitude UAVs are to be purchased from abroad. In contrast, most air force assets are to be acquired from abroad with the exception of KT-1 and KO-1 (domestic R&D), T-50 and FA-50 (co-production with Lockheed Martin), and KF-16 (licensed production). Meanwhile, a great portion of defence articles for the army and the navy are to be acquired through domestic R&D. However, Search (UAV), MLRS, and Firefinder Radar are planned to be purchased abroad. The navy is planning to obtain next generation destroyers (KDX II and III) through domestic R&D, with only Harpoon, LYNX, ISAR(P-3C), and P-3C to be purchased from overseas.

Despite a relatively high dependence on foreign direct acquisition of big-ticket items, South Korea has been trying to increase the local content of its defence articles. Commensurate with South Korea's comparative advantage in information technology and telecommunication, the communication and electronics sector has substantially increased its localisation rate from 72 percent in 2001 to 85 percent in 2007. A slight improvement was also made in the category of precision guidance weapons, where the localisation rate has risen from 56 percent in 2001 to 74 percent in 2007. Although South Korea still relies on US software in the supply and support of both C4ISR and precision weapons, a growing number of South Korean firms such as Samsung-Thales have been developing their own software to support cutting-edge weapons and equipment. However, the localisation rate in the aerospace sector decreased from 59 percent in 2001 to 49 percent in 2007, while both armoured vehicles and naval vessels have shown localisation rates fluctuating above the 60 percent level.<sup>19</sup> Comparatively speaking, South Korea's localisation rate seems quite high. Government's defence procurement policy that favours domestic R&D and localisation worked as a

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<sup>19</sup> Data on localisation rate was obtained from the Korea Defense Industry Association.

positive factor. For example, top priority of the Fund for the Promotion of Defense Industry went to the localisation of parts and components of the defence industry.<sup>20</sup>

**Table 5: Major Defence Article Acquisitions by Armed Services**

	R&D	Co-production or production via technology transfer	Licensed Production	Overseas Purchase
<i>C4ISR</i>	SPIDER, JTDLS, TICN, KJCCS, Army, Navy, Air Force C4I			AWACS, High Altitude UAV
<i>Army</i>	K-9, K1A1, K-77, Chun-Ma, Bi-Ho, Shin-Gung, KRQ-110, NIFV, XK-2	ATACMS, BO-105, KM-SAM, KHP		Search (UAV), MLRS, Firefinder Radar
<i>Navy</i>	LPX, KDX-II, KDX-III, Haesung-I	KSS-I, KSS-II, K731, K745, KAAV, P-3C upgrade		Harpoon, LYNX, ISAR (P-3C), P-3C
<i>Air Force</i>	KT-1, KO-1	T-50, FA-50	KF-16	PAC-2, Hawker-800, HARPY, F-15K, KF-16 Software upgrade, JDAM, GBU-24, GBU-28, AIM-120, AIM-9M, AGM-65D, AGM-65G

Source: *The National Defense White Paper* 1999, 2000, 2004, 2006; DAPA (The Defense Acquisition Program Administration), *Plan for Major Projects 2007*; MND, *National Defense Policy 1998-2002*.

The enactment of the Law on Defense Procurement on 1 January 2006 under the Roh Moo-hyun government gave additional incentives to domestic defence contractors. Article 18 (on Research & Development) of the law stipulates that “Head of the Defense Acquisition Program Administration should give preferential treatment to domestically produced defence articles in procurement”. It was through this legal requirement that LG-CNC was designated as the principal party for negotiation for the KJCCS project. LG-CNC, which was founded in 1987, participated in army C4I system construction. And a consortium comprising Samsung Thales, Huneed technology, and KT won the TICN project.<sup>21</sup> LIG NEX, a subsidiary of LG Group, has also enjoyed a privileged position in the supply of precision-guided weapons such as Shingung (portable surface to air weapons),

<sup>20</sup> Ho-seok Lee et al., ‘Banguisanup Giban Baljoneul uihan Jungchaikbanan Yongu (A Study of Policy Alternatives to Develop the Foundation for the Defense Industry)’, KIDA Report #04-2037 (November 2004).

<sup>21</sup> ChosunIlbo, 23 May 2007, <[http://news.chosun.com/site/data/html\\_dir/2007/05/23/2007052301048.html](http://news.chosun.com/site/data/html_dir/2007/05/23/2007052301048.html)> [Accessed November 2008]

Baeksangeo (light torpedo), and Haesung (surface-to-surface guided missile).

South Korea is still dependent on foreign sources for RMA-related big ticket, cutting-edge items such as AWACS, High Altitude UAV, Search (UAV), MLRS, PAC-2, Hawker-800, HARPY, and F-15K. However, South Korea has made quite a significant progress in RMA-related software, especially on C4IRS. In addition, low altitude surveillance radar, Master Control and Reporting Center (MCRC), TICN, JTDLS, and KJCCS have all been supplied by South Korean defence contractors. They have also been active in the field of precision guidance weapons, naval vessels and aircraft. Confluence of competitive edge in the information industry and government's protective policy has helped South Korean defence contractors' performance in the RMA-related areas.

### **RMA and the South Korean Defence Industry**

RMA requires major changes in doctrine and organisation, as well as advancement in the defence industrial base. New strategy and doctrine emanating from a RMA require new weapon platforms and corresponding defence industrial foundation.

If the weapon and sensor platforms that will be the nodes of NCW are to be smaller, lighter, faster, and less complex, then platform manufacturers will have to build smaller, lighter, faster, and less complex ship and aircraft.<sup>22</sup>

Otherwise, RMA cannot make a meaningful progress. Thus, the existence of a solid defence industry and its forward and backward linkage are essential to the success of RMA. Then, to what extent is the South Korea's defence industry ready for RMA? And how has RMA influenced the reshaping of the defence industry?

The defence industry in South Korea is relatively small in size and oligopolistic in its market structure. Top ten defence contractors' sales reached KW 4.965 trillion, accounting for 77.1 percent of defence contract market in South Korea in 2006 (see Table 6). Top five defence contractors (Samsung Techwin, KAI, Samsung Thales, Hanhwa, Hyundai Heavy Machinery) accounted 46.8 percent of total marketshare, amounting to KW 2.489 trillion. These top five defence contractors all came from RMA-related areas (highly mobile self-propelled artillery for Samsung Techwin, new trainer cum attack fighter for KAI, C4IRS for Samsung Thales, and naval vessels for Hyundai Heavy Machinery). These defence contractors have also engaged in civilian production which has generated positive spin-on effects on the defence industrial sector. Remarkable is that these firms have been able to satisfy RMA-related procurement needs in a timely manner.

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<sup>22</sup> Peter J. Dombrowski, Eugene Gholz, and Andrew L. Ross, 'Selling Military Transformation: The Defense Industry and Innovation', *Orbis*, vol. 46, no. 2 (Summer 2002), p. 526.

Thus, the defence industrial base in South Korea has been to some extent ready for meeting RMA procurement needs from a technological point of view.

This impressive performance can be ascribed in part to changes in government policy. When the defence industry was initiated by the Park Chung-hee government in the 1970s, there was a heavy emphasis on acquisition through domestic R&D. However, as domestic R&D acquisition encountered various problems such as delayed delivery, cost overrun and performance defects, the Chun Doo-hwan government shifted its acquisition policy from domestic R&D to overseas direct acquisition, which in turn depressed the domestic defence industry. In 1998, however, the South Korean government introduced a law for the promotion of civilian-military dual use technology in order to facilitate domestic R&D acquisition, especially for RMA. In January 1999, the South Korean government amended the existing 'Special Law on the Defense Industry' to encourage participation in the defence industry by technologically more specialised firms. More importantly, the Roh Moo-hyun government increased investment in domestic R&D from 4 percent of defence expenditure in 2003 to 6.7 percent in 2007.<sup>23</sup>

**Table 6: The Sales and Market Share of Top Ten Defence Contractors (2006)**

Rank	Company	Sales (KW billion)	Ratio(%)
1	Samsung Techwin	631.2	11.9
2	KAI	544.7	10.2
3	Samsung Thales	452.7	8.5
4	Hanwha	433.7	8.2
5	Hyundai Heavy Industries	426.6	8.0
<b>Total(1-5)</b>		2 488.9	46.8
6	LIG NEX 1	417.0	7.8
7	Doosan Infracore	387.0	7.3
8	Poongsan	312.0	5.9
9	Rotem	297.8	5.6
10	STX Engine	193.8	3.6
<b>Total(1-10)</b>		4 096.5	77.1

Source: Data provided by the Korea Defense Industry Association (2007).

In this RMA-driven restructuring of the South Korea's defence sector, cutting-edge defence industrial firms have been major beneficiaries. Nevertheless, overall corporate performance of the defence industrial sector has been rather mixed. Operation rate of the defence industry has been maintained at a 50 percent level during 1999-2004, which is quite low compared with the average operation rate (80.3 percent in 2004) of the manufacturing sector. Although defence industrial firms improved their

<sup>23</sup> MND, *The Defense White Paper 2006*.

ordinary profits since 2002, they suffered huge deficits in the 1990s.<sup>24</sup> Domestic market saturation of conventional weapons and US regulations of South Korea's arms sales to third countries are likely to continue to undercut the scope of manoeuvres by existing defence contractors in South Korea. Nevertheless, some defence industrial firms—in cooperation with the South Korean government—have been developing indigenous weapons in order to cope with restrictions on third country arms sales by the United States. For example, Samsung Techwin has been successful in developing and exporting K-9 on an indigenous basis. Production and export of KT-1 training aircraft is another successful in this regard. South Korea has also been able to get away from American restriction on exports of KT-50 training aircraft by reaching an agreement with Lockheed Martin. Samsung Thales has also successfully exported RMA-related software through the upgrading of indigenous technology.

RMA-driven defence industrial transformation is also changing the profile of South Korea's exports of defence articles. South Korea used to export military uniforms, ammunition and small arms in the past. As Table 7 illustrates, however, RMA-related big ticket items have emerged as the mainstay of its exports. For example, KAI exported KT-1 (Woongbi basic trainer aircraft) to Indonesia and Turkey, and will be concluding a supply contract of T-50 (Golden Eagle trainer aircraft) with the United Arab Emirates soon. Samsung Techwin has also been successful in exporting K-9 self-propelled howitzers to Indonesia during 2000-2005. The Hyundai Heavy Machinery, the STX and the Hanjin Heavy Industries have exported various naval vessels (FFK—Ulsan class Frigate Korea, LST—Landing Ship, Tank, and Flexible Support Ship) to Indonesia, Bangladesh, and Venezuela.<sup>25</sup>

**Table 7: Korea Military Exports by Major Items (US\$ million)**

Item	Export Nation	Terms	Amount of Export
KT-1/KO-1(KAI)	Indonesia	2002–2005	60
	Turkey	To be supplied during 2010–2013	500
T-50(KAI)	UAE	Contract scheduled in 2008	2 700
K-9 (Samsung Techwin)	Turkey	2000–2005	300
LST (Hanjin Heavy Industries)	Indonesia	2002	150

Source: Data obtained from the Defense Acquisition Program Administration.

<sup>24</sup> The Korean Institute for Defense Analysis (KIDA), *Analysis of Defense Budget 2006 and the Prospect for 2007* (Seoul: KIDA, 2006), p. 74 (in Korean).

<sup>25</sup> See 'South Korean Arms Industry Emerges as Global Power', *Defense News* (16 July 2007).

Table 8 presents more detailed figures on exports of defence articles by South Korea. Military exports rose from US\$147 million in 1998 to US\$255 million in 2006. In cumulative terms during 1998-2006, exports of military aircrafts and related services have accounted for about 24 percent of total military exports, followed by naval vessels (23 percent), ammunition (21 percent), and off-set based exports (14 percent). South Korea has shown two noticeable trends. One is a trend toward export of big ticket items such as aircraft and naval vessels, which are closed related to RMA. The other is a trend toward Koreanisation of defence articles. Having experienced enormous pressures from the United States regarding third country arms sales regulation in the 1980s and 1990, South Korea has been more actively pursuing production of defence articles through domestic research and development.

**Table 8: Korean Defence Exports by Year and Items (by Permit) (figures in US\$ million)**

	1998	1999	2000	2001	2002	2003	2004	2005	2006
<i>Total</i>	147.2	196.6	100.2	237.2	143.9	266.8	417.8	262.3	255.2
<i>Ammunition</i>	37.2	46.5	19.1	43.7	24.3	27.1	80.6	26.1	50.7
<i>Fire Power</i>	3.7	4.5	5.2	66.5	65.2	44.4	52.7	27.9	63.2
<i>Mobile</i>	0.11	81.8	2.52	35.9	10.4	24.2	4.17	23.6	22.2
<i>Naval Vessel</i>	99.9	59.2	11.0	35.3	0	75.9	151.0	1.26	0
<i>Communication</i>	0.9	1.6	2.8	5.4	2.3	3.1	17.4	0.57	6.52
<i>Aircraft</i>	3.0	2.5	0.3	0.9	33.6	63.1	66.9	152.3	93.1
<i>Service</i>	0	0	9.54	39.1	8.18	0	36.6	11.8	6.37
<i>Others</i>	2.33	0.67	49.8	10.4	0.04	29.1	8.5	18.7	13.1
<i>Offset Trade (Ratio)</i>	9.2 (6.3%)	14.9 (7.6%)	1.1 (2.0%)	8.5 (3.6%)	3.0 (2.1%)	37.8 (15.7%)	76.1 (18.2%)	109.5 (41.8%)	NA

Source: The Korea Institute of Defense Analysis, *Bangsansuchul Hwalsunghwaruluihan Sijangjosabunsok mit Suchuljonryak Surip* (Market Survey Analysis and Export Strategies for the Promotion of Defense Industrial Exports), (Seoul: KIDA, 2007), pp. 31-2. Additional data have been provided by DAPA.

## Conclusion

We have examined an overall profile of South Korea's defence industry as related to the revolution in military affairs. We can generate several interesting theoretical and empirical implications from the South Korean case. First, South Korea has not officially adopted the RMA as a doctrine, but it has been moving into the direction of innovating and restructuring the military in accordance with vision and principles of RMA. Second, impetus for RMA in South Korea has come primarily from its efforts to adjust to new security challenges and shifting alliance relations with the United States. The more autonomous South Korea wishes to be, the more assertive it must be in securing RMA-related assets such as C4IRS. It is because of South Korea's heavy dependence on the United States for its RMA-related needs such as C4IRS, and naval and air combat readiness. Third, South Korea's active pursuit of RMA since 1999 has generated profound impacts on the

structure of its defence industry. Whereas South Korea relies on foreign direct acquisition for big ticket hardware items, an increasing number of defence contractors have moved into RMA-related areas, and have performed well. Allocation of R&D investment, domestic defence production, and military exports are all likely to be framed around the RMA. Finally, South Korea's RMA-related experience shows that spin-on, rather than spin-off, has emerged as the driving force behind a smooth implementation of RMA. Comparative advantage in commercial, industrial sectors such as the information and telecommunication industry has generated positive spin-on effects on the RMA-related defence industry.

*Chung-in Moon is a Professor of Political Science at Yonsei University and Editor-in-Chief of Global Asia, a quarterly magazine. He has published over 40 books and 230 articles in edited volumes and scholarly journals. His recent publications include The United States and North East Asia: Debates, Issues and New Order; Handbook of Korean Unification; Arms Control on the Korean Peninsula; War and Peace in Asia; and Ending the Cold War in Korea. [cimoon@yonsei.ac.kr](mailto:cimoon@yonsei.ac.kr).*

*Major Jin-Young Lee is a fighter pilot and pilot instructor in the Korean Air Force. He is pursuing a PhD in politics at Yonsei University.*