National Defence Défense nationale

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THE SOUTH KOREAN DEFENCE INDUSTRY

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JCSP 40

Exercise *Solo Flight*

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12 MAY 2014

Word Count: 3186

INTRODUCTION

The South Korean defence industry has developed rapidly over past decades. It has been driven by its government policy to promote domestic defence industry. The global defence industry has paid attention to the performance of South Korean defence industry. There are some evidences that show the South Korean defence industry capability. In 2012 Britain Royal Navy contracted 452 million pounds for the support tankers with the Daewoo Shipbuilding & Marine Engineering Co(DSME). Britain critics stated "the decision was a blow the Britain's declining shipbuilding industry and to the proud naval tradition of what was once the world's greatest seafaring nation".[1] The Korea Aerospace Industries(KAI) has signed total US$ 1.18 billion worth of contract to export 52 FA-50, a light attack variant of the T-50 Golden Eagle supersonic trainer aircraft, to Indonesia, Iraq and Philippines respectively. The South Korean exports of weapons reached an all-time high of USD 3.4 billion in 2013 on strong sales of home-grown aircraft and naval ships, the state-run arms procurement agency said on 4 January 2014, according to Yonhap News. [2]. The amount is USD one billion more than that of 2012, and 14 times that in 2006. The most of exports came from leading aircraft makers and shipbuilders, which tapped emerging countries in the Middle East and Latin America. Arms exports are meaningful as boosting competitiveness of South Korean defence firms by expanding their market internationally, overcoming limited demand in the domestic market.

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[1] Daily Mail, Ian Drury, "Navy buys Korean to keep its ships fuelled: £452m contract for four tankers goes to the Far East", Last Accessed 29 April 2014. http://www.dailymail.co.uk/news/article-2105100/Navy-buys-Korean-ships-fuelled--452m-contract-tankers-goes-Far-East.html

[2] Yonhap News. Last Accessed 30 April 2014. http://www.yonhapnews.co.kr/bulletin/2014/01/02/0200000000AKR20140102060200043.HTML?from=search

South Korea is considered as already a aggressive competitor with Europe in high-end civil products and military components, matching Western standards for quality and performance.[3] In this essay, I will first review the South Korean government policy on defence industry and assess South Korea's defence industrial performance and then will suggest the implication of South Korean defence industry to Canada.

South Korean Government Policy on Defence Industry

The security and economy have been always top issues to both politicians and the public in South Korea. North Korea threat is crucial factor that has driven South Korea to build a strong military, as well promoting economy is fundamental to the future of country. Since the South Korea government started to develop defence industry in the early 1970s, it has pursued ambitious defence industrialization in order to enhance its military self-reliance capabilities.[4] Also South Korean government has sought to raise the percentage of military equipment and weapons produced in Korea.[5] Especially the last South Korean government considered defence industry as "new economic growth engine", "fostering the defence

[3] ECORYS SCS Group, "Study on the Impact of Emerging Defence Markets and Competitors on the Competitiveness of the European Defence Sector, Final Report", *FWC Sector Competitiveness Studies(*12 February 2010) , 24.

[4] Hee-Jung Moon, "The diamond approach to the competitiveness of Korea's defence industry: From the Park, Chung Hee to Lee, Myung Bak era", *Journal of International Business and Economy Fall 2010,* 70.

[5] U.S. Congress, Office of Technology Assessment, *Arming Our Allies: Cooperation and Competition in Defence Technology OTA-ISC-449*(Washington, DC: U.S. Government Printing Office, May 1990), 111.

industry as a new economic growth engine" and that was one of the 100 tasks of the last government.[6]

The defence industry contributes to the national economy by creating new jobs and export, and it is crucial player to national security by supplying good quality defence products to the military. As mentioned above, the Ministry of National Defence(MND) has made its effort to foster the defence industries so as to not only acquire advanced capabilities, but also to support the defence industry development and the national economy. Even though the government was changed in 2013, its policy on defence industry has never changed significantly. *The 2012 Defence White Paper* highlights that the MND continues to put forward its efforts to promote the defence industry in support of the national economy.[7] The MND states that the competition to increase their overseas market share among the global defence industrial companies has been even intense because developed countries have faced the defence budgets of constraints and the requirement of weapons with cutting-edge technologies increased. The policies on defence industry are summarized as supporting to build up competitiveness of companies and to promote their R&D, and exports.[8] More detail in policy is as follows.

First, the South Korean government is working hard to boost the competitiveness of defence industry products and companies. For example, the government is guaranteeing the quality of products by awarding the Defence Quality(DQ) Certification Mark for high-quality defence industry export products. Also, it is supporting the education and training of experts

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[6] Korea Times, Byun Moo-keun, "Defence Industry Is New Economic Growth Engine", Last Accessed 10 May 2014. http://www.koreatimes.co.kr/www/news/issues/2014/03/270_39728.html

[7] ROK Ministry of National Defence, *2012 DEFENCE WHITH PAPER*(SEOUL : MND, 2012), 245.

[8] Ibid., 246~249.

in the defence industry and facilitating meetings with chief executive officers(CEOs) in order to enhance the companies' export capacity. In addition, the government is expanding financial support to small and medium-sized businesses for defence industry exports.

Second, the government is developing defence industry export markets and promoting marketing activities. The South Korean government has established a tailored export strategy, optimized to the demands of customer countries by region, and has been conducting market development activities in future effective markets in Africa, the Middle East, and Latin America. Moreover, it has been facilitating high-level military exchanges and cooperation, such as the meetings with the foreign military attachés, and enhancing the foundations for a defence industry export market by promoting the Seoul ADEX as a world-class defence industry exhibition.

Third, the government is strengthening the industrial basis that supports the defence industry export. The development of national defence science and technology is a prerequisite for the competitiveness and systematic development of the defence industry. As such, the MND has been exerting efforts to increase the defence research and development capabilities and establish the foundations for future acquisition by expanding the level of investment in research and development from 6.6 percent of the defence budget in 2011 to 7.1 percent in 2012. Moreover, when partner countries request additional assurances for the stable implementation of contract, the South Korean government is operating the government-to-government(G2G) sales support system in which the government mediates or supervises the export sales. Furthermore, in order to ensure the sustainability of weapons system management, the government is putting forward efforts to institutionalize early on the Defence Exports Follow-Up-Logistics Support Systems, which entails providing logistical support elements, such as materials, facilities, and personnel, to partner countries. Also, other

efforts to enhance the industrial foundations in support of defence exports, including the development of Defence Export-Import Support Information System in order to provide real-time defence industry trends and marketing information exchange among relevant offices, are being put forward.

Performance of Defence Industry

Before I assess the performance of South Korean defense industry, it is essential to mention the evolution of defence industry in general. There are several stages of the Korean defence industrial development; "from simple assembly, to imitation through reverse engineering, licensed production, creative imitation, and innovation and development and production of indigenous weapons."[9] The South Korean defence industry began with production of rifles which imitated M-16, the ammunitions and other small arms not significantly considered advanced technology, it rapidly developed and produced of more advanced defence products, from the production of K-1 88-tanks(manufactured by Hyundai, baed on General Dynamics' M1 Abrams) and K200-KIFV(Korea Infantry Fighting Vehicle, manufactured by DaeWoo and based on the American AIFV) in the mid-1980s to K-1(produced by KAI, basic trainer aircraft), Chang Bogo class submarine(upgraded German 209-type, produced by DMSE), in 1990s, K-50(developed by KAI, supersonic advanced trainers and multirole light fighters), Son Won Il class submarines(German 214-type submarines, produced by Hyundai) in recent years.[10] I select three dominances of South

[9] Chung-in Moon and Jae-Ok Paek, "Defence Innovation and Industrialization in South Korea", *SITC Policy Brief No.14(September 2010)*, *3.*

[10] Ugurhan Berkok and Christopher Penney, Karl Skogstad, "Defence Industrial Policy Approaches and Instrument(July 2012)", *Canadian Aerospace Review*, 36. Last accessed 8 May 2014. http://aerospacereview.ca/eic/site/060.nsf/eng/home

Korean defence industry based on its exports and advanced technology applied to production in order to assess its performance; Aerospace, Maritime, Ground.

Aerospace: As mentioned above, the aerospace defence industry is one of powers to lead South Korean arms exports. The development of aerospace industry has derived from; "(1) the maintenance of US aircraft based on Korean territory and of its own aircraft (at present this applies particularly to the national fleet of F15 and F16 aircraft) (2) subcontracting activities for the US industry".[11] The development of South Korean aircraft traced back in 1970s by starting on assembling the 500MD helicopter with American technology support, in 1980s South Korea co-produced 68 F-5E/F -engine manufactured Samsung, assembled by Korean Airline – in the 1990s South Korea produced 140 KF-16C/D fighters under license from Lockheed Martin. Meanwhile, South Korea initiated the KTX program-T-1 basic trainer- to develop the first indigenous Korea aircraft in 1988, the final flight test of it was successful in 1998. Following success of T-1, South Korea embarked the new aircraft developing program to produce T-50 through domestic R&D and Lockhee Martin's technical support. T-50 is used for trainer and has combat variants as well, namely T-50B, TA-50, and FA-50. Since 2011, South Korea has succeeded deals to sell T-1 and T-50s to Indonesia, Turkey, Peru, Iraq and Philippines, KAI is seeking to export T-50 to several countries including the United Arab Emirates.[12] Furthermore T-50 is one of three candidates for U.S. Air Force's T-38 replacement program , for which Lockheed Martin is the lead-

[11] ECORYS SCS Group, "Study on the Impact of Emerging Defence Markets and Competitors on the Competitiveness of the European Defence Sector, Final Report"..., 184.

[12] Yonhap News, Last accessed 10 May 2014. http://english.yonhapnews.co.kr/national/2014/03/28/42/0301000000AEN20140328003400315F.html

contractor partner.[13] If South Korea success the deal with U.S, it is very helpful to export more T-50s.

The professor of Yonsei university, Chung-in Moon said that "at the present South Korea is estimated to remain at 60~70 percent of major countries in the plane design/test technologies and 30~50 percent in the core parts/materiel design and production technologies."[14] He also mentioned that "the rate of localization for plane engines stands at a mere 30 percent."[15] However, South Korea could accumulate and develop the relevant technologies by engaging in licensed production and investing R&D. It is not easy to obtain cutting-edge or state-of-the-art technology in the near future. Back to the 1980s, any one did not expect that South Korean electronics companies could dominate a global market. The researcher of Korea Defence and Security Forum, Yang wook said that "South Korean defence industry has a similar challenge".[16]

Maritime : According to 'Website Marine insight' five Korean shipbuilders were included in the top 10 shipbuilding companies in the world and especially from the first to four largest shipbuilders are all Korean including Hyundai, DSME, Samsung in 2012.[17] South Korea is a worldwide competitor in building ship and also exports naval ship. At the present, four shipbuilders like Hyundai, DSME, Hanjin, STX share the military shipbuilding market in Korea. In the 1980s South Korea started to produce indigenous naval ship such as

[13] Defense Media Network, Last accessed 9 May 2014. http://www.defensemedianetwork.com/stories/t-38-replacement-moves-ahead-but-without-funding/

[14] Chung-in Moon and Jae-Ok Paek, "Defence Innovation and Industrialization in South Korea"..., *3.*

[15] Ibid, 3.

[16] Finance Times, Last accessed 10 May 2014. http://www.ft.com/intl/cms/s/0/66a9a33a-42ea-11e3-8350-00144feabdc0.html#axzz31QxEdz9g

[17] Marine Insight, Last accessed 8 May 2014. http://www.marineinsight.com/marine/marine-news/headline/top-10-shipbuilding-companies-in-the-world-in-2012/

Ulsan class frigates and Donghai class corvettes. Kwanggaeto the great class destroyers(DDH-I) and Chunji class supply ship(AOE) was produced in the 1990s, Chungmugong class destroyers(DDH-II) and King Sejong the great class Aegis destroyers(DDH-III) followed them in the 2000s. Most of naval ships have been built in Korea including those above ships and mine hunting, amphibious, fast-patrol ships, however the shipbuilders are still reliant on supply of foreign equipments.[18] For example, most of ships engines are the German diesels and American Gas-turbines, the core weapon combat systems are the American, Dutch and British productions. So far, South Korea has developed and deployed the weapon control system, surface-to-surface guided missiles and cruise missile capable of a precision strike anywhere in North Korea. DDH-II, III and submarines are equipped with those missiles and initially the development of missile project was secret, however the government unveiled it in 2013.[19] Recently Incheon class frigates(FFX) has a higher rate of equipments such as weapon control system and missiles, torpedo, gun, sonar, 3D radar, etc., which will replace the aging fleet of Ulsan class frigates and Donghae class corvettes. The success of FFX could also give greater credibility to South Korean defence exports.[20]

The South Korean submarine was developed and produced with German technologies and supports. In 1990s the first submarine of Chang Bogo class(209 type) was built in German and then eight 209 type submarine were manufactured by DSME. In 2000s Sonwonil

[18] ECORYS SCS Group, "Study on the Impact of Emerging Defence Markets and Competitors on the Competitiveness of the European Defence Sector, Final Report"..., 185.

[19] International Buisness Times, Amrutha Gayathri, "South Korea Unveils Cruise Missile Capable Of Striking 'Anywhere' In North Korea", Last accessed 10 May 2014. http://www.ibtimes.com/south-korea-unveils-cruise-missile-capable-striking-anywhere-north-korea-1084636

[20] ECORYS SCS Group, "Study on the Impact of Emerging Defence Markets and Competitors on the Competitiveness of the European Defence Sector, Final Report"..., 186.

class(214 type) has followed in same way of 209 class. South Korea is still dependent on foreign technology to produce submarines, especially Germany. However, South Korea has produced submarines locally and initiated the new submarines project(KSS-III, a 3,000-ton class advanced conventional attack submarine) in 2008 and KSS-III will be produced in 2020.

As with surface ships, South Korea is still reliant on foreign technology to produce submarines. However South Korea has enhanced submarine shipbuilding technology and developed the next submarine. It seems to succeed to develop the next submarine thanks to shipbuilding capability. South Korea has exports frigate to Bangladeshi, supply ship to Venezuela and New Zealand and contracted deals to sell supply ship Norway and UK, submarine to Indonesia, frigate to Thailand.

Ground: South Korea's force structure reveals the dominance of ground forces; therefore, great emphasis has been placed on the improvement of maneuver equipment and firepower. As with other latecomers, South Korea followed a classic path of defence industrialization in this arena. In the 1970s, South Korea simply assembled imported parts and components, but starting in the late 1980s, it began to develop Korean models. Since the 1990s, indigenization efforts have become further intensified through performance improvement of Korean models, and consequently, South Korea has successfully developed its own models such as K-1 tank, 155mm M-109 self-propelled howitzers.[21] The performance of these weapons compares favorably with those made in first-tier arms producing countries,

[21] Global Security, "Defence Industry", Last accessed Last accessed 10 May 2014, http://www.globalsecurity.org/military/world/rok/industry.htm

but they still depend on overseas sources for development of core components, such as engines, transmissions, and active protection systems.[22]

South Korea depends on foreign technologies- laser detection sensors, navigation devices- for future weapons systems. Nevertheless, South Korea has an ambitious plan to produce major maneuver and firepower weapons through domestic R&D. Overall economic conditions and levels of technological sophistication have been conducive to implementing such plans.

Institutional Arrangements for Defense Innovation

Satisfaction of basic weapons needs in a relatively short time span, swift transition to cutting-edge defense industrial items, an increase in defense exports, and most important, constant industrial and technological upgrades through innovation underscore the success story of the South Korean defense industry. The institutional arrangements that have facilitated industrial and technological innovation include the following:

Embeddedness in the commercial sector: When South Korean defense industrialization was initiated in the early 1970s, it followed the Japanese model based on the commercial industrial complex with greater spin-on effects for the defense sector.[23] South Korea selected and assigned a relatively small number of big business conglomerates (chaebols, such as Samsung, Hyundai, LG) to engage in strategic industrial sectors (steel, automobile, ship-building, electronics, special metallurgy) with greater forward and backward linkages with the defense industrial sectors. These chaebols were in turn forced to undertake civil–military dual production. In the 1970s, these firms were by law required to

[22] Chung-in Moon and Jae-Ok Paek, "Defence Innovation and Industrialization in South Korea"..., 5.

[23] Chung-in Moon and Jae-Ok Paek, "Defence Innovation and Industrialization in South Korea"..., *4*.

allocate 70 percent of their production capacity for defense, and the remaining 30 percent for commercial production. As demands from the military sector declined throughout the 1980s, they were allowed to adjust the commercial–military production mix in a more flexible manner. Dependence on big business conglomerates still continues. Of the top ten defense contractors, nine are subsidiaries of chaebols. Despite risks of economic concentration and monopoly, the institutional arrangement that embedded defense industrial production in the commercial–industrial sector, especially around chaebols, turned out to be rewarding by reducing sunk costs, assuring a flexible production base, and facilitating technological innovation through the synergy of civil and military technologies.[24]

Linking spin-off and spin-on: Although defense production was embedded in the commercial and industrial sectors, synergy effects from both sectors were insignificant. It was only after the introduction of laws concerning the promotion of civil–military dual use in 1999 that more systematic attention was given to the promotion of dual-use technology. The law stipulated that the ministries of national defense, science and technology, industry, resources, and energy, and information and telecommunications form a consortium to undertake joint projects. Although the government invested a total of 260 billion won in 100 projects, only 25 projects were successful. Though limited, the idea of spin-off is working. Between 1995 and 2008, the military transferred 102 defense technologies to 160 commercial firms.

The last government was more actively pursuing the promotion of dual-use technology by amending the law on the promotion of dual-use technology in 2009 to one that emphasizes the enhancement of civil–military cooperation. At the same time, spin-on efforts

[24] Richard Weitz, "South Korea's Defense Industry: Increasing Domestic Capabilities and Global Opportunities", Academic Paper Series(Korea Economic Institute America, November 7, 2013), 4.

have become further strengthened. As part of the Advanced Concept Technology Demonstration (ACTD), the Defense Acquisition Program Administration (DAPA) and the Joint Chiefs of Staff (JCS) invested 1.56 billion won in three projects. DAPA is planning to spend 10 billion won for eight projects, concentrating on portable tactical computers, an unmanned mine destroying vehicle, and a portable unmanned aircraft control system.

Streamlining R&D investment and related activities: South Korea's defense R&D has increased in both absolute amount and relative share of the defense budget. Compared with the past, recent defense R&D expenditures have become much more focused, as evidenced by Defence Reform Plan 2020 emphasized defence R&D.[25] The development of national defense science and technology is a prerequisite for the competitiveness and systematic development of the defense industry. As such, the MND has been exerting efforts to increase the defense research and development capabilities and establish the foundations for future acquisition by expanding the level of investment in research and development from 6.6 percent of the defense budget in 2011 to 7.1 percent in 2012.[26] The private sector has also been increasing its defense R&D investment and leading defense contractors' R&D investment/sales ratio rose remarkably, as revealed by Samsung Thales (16.9 percent), LIG Nex1 (10.6 percent), Hanwha (6.4 percent), and Samsung Techwin (4.3 percent).[27]

Implication of South Korean Defence Industry to Canada

[25] Richard Weitz, "South Korea's Defense Industry: Increasing Domestic Capabilities and Global Opportunities", Academic Paper Series(Korea Economic Institute America, November 7, 2013), 4.

[26] ROK Ministry of National Defence, *2012 DEFENCE WHITH PAPER*(SEOUL : MND, 2012), 248.

[27] Chung-in Moon and Jae-Ok Paek, "Defence Innovation and Industrialization in South Korea", *SITC Policy Brief No.14(September 2010)*, 6.

The Royal Canadian Navy(RCN) has two the *Protecteur*-class auxiliary oil replenishment (AOR) ships launched in 1969 and the Joint Support Ships(JSS) will replace them.[28] According the National Shipbuilding Procurement Strategy(NSPS), Canada will build naval vessels in its two shipyards, one building combat vessels and the other non-combat vessels while maximizing economic benefits across the country.[29] However, the cost of JSS is so expensive that the contract to build has yet signed. On Oct. 30, 2013 Jack Granatstein, a Canadian Defence and Foreign Affairs Institute senior fellow, issued a report questioning the high costs of Canadian ship construction under the National Shipbuilding Procurement Strategy(NSPS). He noted "Canada will acquire two supply ships for about CAN $3 billion, while Britain's Royal Navy is buying four roughly similar vessels from South Korean builders for $750 million."[30] As Norway and UK signed the contracts, the construction of JSS in Korea could be a good option for Canada.

Conclusion

The development of South Korean defence industry has gone after its commercial and industrial sector. South Korea's defence industrial performance has been impressive by any standard. It was able to satisfy most of its basic weapons needs within a decade after launching its defence industry. Aerospace, maritime and ground platforms have been

[28] Royal Canadian Navy, Last accessed 10 May 2014. http://www.navy-marine.forces.gc.ca/en/fleet-units/supply-home.page

[29] Government Industry Canada, Last accessed 10 May 2014. http://www.ic.gc.ca/eic/site/sim-cnmi.nsf/eng/uv00050.html

[30] DAVID PUGLIESE, Canada Resists Building Navy Ships Offshore, Last accessed 11 May 2014. http://www.defensenews.com/article/20131206/DEFREG02/312060020/Canada-Resists-Building-Navy-Ships-Offshore

developed by the efforts of government and industry. Especially South Korea has strong commercial companies of shipbuilding, motors and electronics. Furthermore South Korea government policy on defence industry has driven the defence industry to export its products more and more. According to the Congressional Research Service of U.S released in August 2012, South Korea was the fifth largest conventional arms exporter in 2012.[31] South Korean defense industry is still dependent on foreign high-technology. However South Korea is moving from the stage of imitation and assembly to that of creative imitation and indigenization. In near future, it could compete with major arms-supplying countries in the world. The high technology of commercial and defence industry, the ability to learn quickly will allow South Korea to catch up with the global leading defence industrial countries.

The South Korean naval shipbuilders have shown their capability to produce vessels in good quality by signing contracts to sell supply ships to the Royal and Norwegian Navy respectively. The Canadian Forces(CF) faces budgetary constraints. Definitely it will bring a great benefit to the Canadian economy if the JSS is built in Canada. However, further researches need to assess economic benefit by building the JSS in Canada or buying overseas. As mentioned above, the JSS is more expensive than the Royal Navy supply ship. If the Canadian government decide to buy the JSS oversea, South Korea could be one of good options. Recently Canada and South Korea signed the Free Trade Agreement (FTA) and South Korea is the first Asian country to sign the FTA with Canada. Two countries may work together in the defence industry.

[31] Korea Herald, Last accessed 10 May 2014.
http://www.koreaherald.com/view.php?ud=20120903000894

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Yonhap News, Last accessed 10 May 2014. http://english.yonhapnews.co.kr/national/2014/03/28/42/0301000000AEN20140328003400315F.html