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South Korea's push for defence semiconductor self-sufficiency

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South Korea, like other advanced economies, is affected by US-China strategic competition and tightening semiconductor trade restrictions. US export controls and the risk of a Chinese invasion of Taiwan have exposed supply chain vulnerabilities in South Korea's defence sector, which remains heavily dependent on imported semiconductors. Although South Korea has a globally renowned semiconductor industry, its production is tailored to commercial rather than defence applications. Due to these supply chain risks and defence-sector objectives, including in military AI, the state is now pursuing defence semiconductor self-sufficiency. There is a new strategy for this purpose, which merits EU and Swedish attention. Success is likely in chip design and packaging; the core challenge lies in wafer fabrication. The challenges discussed in this memo highlight the policy risks of reducing semiconductors to a mere "dual-use technology."

This memo outlines the role of semiconductors and artificial intelligence (AI) in South Korea's defence planning, and analyses the current limitations of the country's semiconductor industry as a defence supplier, recent state-led initiatives to build domestic defence-semiconductor production capacity, and the challenges ahead in achieving self-reliance. The memo draws on a study trip to South Korea in April 2025, including meetings with government officials, academics, researchers, industry representatives, and other professionals.[1]

Import dependency and supply chain risks for defence semiconductors

As noted by a security studies researcher, the three most critical technologies in South Korea, based on government investment priorities, are AI, semiconductors, and quantum technology. These are general-purpose technologies, important to both the commercial and defence sectors.[2] AI and quantum technology, with military applications in areas such as surveillance, decision-making, and communications, are among the top ten technology priorities in South Korea's 15-year plan for defence S&T innovation, alongside other semiconductor-dependent dual-use technologies.[3]

Meanwhile, South Korea is almost entirely import-dependent on the semiconductors required by its military's weapon systems (henceforth "defence semiconductors"). According to a survey by the Defence Acquisition Program Administration (DAPA), under the Ministry of National Defense (MND), of 6945 semiconductors installed in 54 weapon systems, including radars, guided weapons, and military communications, 98.9 per cent were imported. Notably, 100 per cent of system semiconductors, the "brains" of electronic devices, were foreign-sourced. These perform essential functions such as computation, control, and signal translation and transmission. Import dependency for power and memory semiconductors was also near total. Most defence semiconductors were imported from the US (85.7 per cent), followed by Europe (8.4 per cent) and Japan (2.6 per cent).[4] According to defence industry researchers, a typical import pathway sees chips designed in the

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2 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.

3 '24~'38 국방기술기획서 (일반본) [Defence Technology Plan 2024-38: General Version], 8 July 2024, Korea Research Institute for Defense Technology Planning and Advancement, *https://www.krit.re.kr/krit/bbs/gbgs_list.do?gotoMenuNo=03090100*.

4 Han Young-dae, Park Hye-won, and Kim Min-ji, 반도체 강국인데…K-방산 핵심두뇌칩 국산화율 '0%' ["Despite Being A Semiconductor Powerhouse… K-Defense Industry Core Brain Chip Localization Rate '0%'"], *Korea Herald Business*, 24 March 2025, *https://biz.heraldcorp.com/article/10447321*.

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US, manufactured and packaged in Taiwan and/or in the US, integrated into electronic components in the US, and then shipped to South Korea for installation in weapon systems.[5] Despite a relatively high degree of localisation in other critical components for defence electronics, at least at some levels of abstraction, defence semiconductors appear to be an exception.[6]

As alluded to above, AI receives special emphasis among South Korea's goals for its future defence capabilities. A prioritised application for military AI, and for civil-military technology cooperation, is in Manned-Unmanned Teaming (MUM-T). The country's low birth rates and looming issues regarding the supply of military personnel underpin the heightened emphasis on unmanned autonomous systems. Other targeted AI applications include joint command systems and on-device generative AI applications more broadly.[7] AI is also central to early-warning systems against potential North Korean mass missile strikes and drone swarms.[8] Russia's war against Ukraine has simultaneously highlighted both the risk that North Korea's involvement has advanced its drone warfare capabilities and the role of semiconductors in unmanned weapon systems.[9] Defence companies such as Korea Aerospace Institute, Hanwha Aerospace, and Hyundai Rotem are developing advanced multipurpose unmanned vehicles and AI pilots. This requires numerous and diverse defence semiconductors, and lead times from foreign suppliers are increasing given the global shift toward AI weapon systems.[10] It is important to note that self-reliance is a major state priority for South Korea's defence sector. South Korean defence industry representatives pointed out that the preferred option for defence acquisition is always a domestic supplier, provided there is enough time for domestic R&D and production. Foreign suppliers are used only when time does not permit domestic acquisition. Self-reliance and prompt deliveries thus take precedence over cost.[11]

Bipartisan US policies to restrict semiconductor-related trade with China in recent years have made South Korea acutely aware of geopolitically driven supply chain risks. One recent precedent is the December 2024 Biden administration ban on exports of high-bandwidth memory (HBM), critical to state-of-the-art AI chips, to China. South Korean companies Samsung and SK Hynix, with China as both a key export market and production base, together account for the majority of global HBM output. Their production depends on US-made equipment, allowing the US to control HBM exports through the Foreign Direct Product Rule.[12] Supply chain risk management has become even more salient under the second Trump administration, which has shifted from Biden's focus on restructuring global supply chains with like-minded countries to prioritising US domestic industry with little regard for allies.[13]

Yet it is not only the US's ability to leverage supply chain dependencies that threatens South Korea's freedom of action and incentivises self-sufficiency. China is also part of the threat perception. A potential Chinese invasion of Taiwan would severely disrupt supply chains for South Korea's defence industry.[14] South Korea's significant economic dependence on China plays a part as well. For example, in April 2025, China warned South Korean tech companies, including electronics producers, not to sell products containing Chinese rare earth minerals to US military contractors, in response to US tariffs.[15] This underscores South Korea's dependence on Chinese critical raw materials, including for semiconductors. Still, South Korea tends to tread carefully with its large neighbour. For instance, foreign policy strategies do not explicitly identify China as a threat. Unlike the EU or the US, South Korea lacks the political clout to oppose China openly.[16]

Dependence on foreign defence semiconductors, not least from the US and Taiwan, and the risk of import delays or restrictions pose a threat to South Korea's

5 Interview with defence industry researchers at a South Korean research institute, 28 April 2025; interview with a security studies researcher at a South Korean research institute, 23 April 2025.

6 Korea Defense Industry Association, 국산화율 현황 ["Current parts localization status"], 13 September 2022, *https://kdia.or.kr/kdia/contents/defense-info25.do*.

7 Interview with defence industry researchers at a South Korean research institute, 25 April 2025.

8 Interview with a foreign business representative with insight in South Korea's defence sector, 22 April 2025.

9 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.

10 *Korea Herald Business,* "Semiconductor Powerhouse."

11 Interview with representatives of the South Korean defence industry, 21 April 2025.

12 Jessica Tsai, "US tightened chip controls put Samsung's China operations at risk," *Digitimes,* 18 December 2024, *https://www.digitimes.com/news/a20241218PD211/samsung-hbm-nvidia-technology-bandwidth.html*.

13 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.

14 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.

15 Hyunjoo Jin, Hyunsu Yim and Lewis Jackson, "China asks Korea not to supply products using rare earths to US defence firms, paper reports," *Reuters*, 23 April 2025, *https://www.reuters.com/markets/commodities/china-asks-korea-not-export-products-using-rare-earths-us-defense-firms-paper-2025-04-22/*.

16 Interview with South Korean government officials, 23 April 2025.

defence industry and its international competitiveness, which relies on fast deliveries and generous technology transfers.[17] In fact, dependence on foreign technology could even prevent South Korea from exporting arms to certain countries. For instance, US International Traffic in Arms Regulations regulate sales of weapon systems containing US components to third countries. A lack of access to defence semiconductors could also prevent the development of new technologies, with implications for South Korea's future military capabilities and its ability to deter the North Korean threat.[18] Moreover, defence semiconductors are essential for domestic development of certain existing capabilities for which South Korea still relies on the US military, such as intelligence, surveillance, and reconnaissance systems.[19]

The South Korean semiconductor industry's limited defence supplier role

The semiconductor industry is of strategic importance to South Korea, representing 19.3 per cent of exports in 2022. The South Korean semiconductor industry, including the two giants Samsung and SK Hynix, revolves heavily around the production of memory chips, primarily used for data storage in commercial applications. Samsung and SK Hynix are among a select few companies at the center of the global AI race and the proliferation of data centers for high-performance computing, as they spearhead international production of HBM. Notably, SK Hynix has recently overtaken Samsung by becoming the primary supplier for the US AI chip design giant Nvidia.[20]

However, the South Korean industry's capacity for designing and manufacturing system semiconductors, including a variety of special-purpose semiconductors with national defence applications, is limited.[21] Generally, commercial semiconductors are not suitable for defence applications. Even though Samsung is one of just a few companies worldwide with the capability to produce the most advanced logic chips, these do not cater to defence needs.[22] Apart from verified compatibility with specific weapon systems, defence semiconductors need to be reliable and stable in harsh environments exposed to, for instance, shocks, radiation, and extreme heat. Besides requiring durability, certain performance requirements might not align with commercial design priorities.

The main reason for the South Korean semiconductor giants' limited involvement in the defence market is purely economic. The companies lack incentives, since demand for defence-purposed semiconductors is limited and profitability is low. Production of defence semiconductors comes with complicated requirements and demands extensive infrastructure.[23] Unit costs are high, with limited possibilities for economies of scale. To break even on investment expenditures for defence semiconductors, production lines have to be maintained for 20–30 years. Samsung has previously suggested the company would participate more in the defence market if the government could guarantee their profits, which it cannot.[24] Also, companies such as Samsung and SK Hynix are preoccupied with domestic and international, notably Chinese, competition for high-end memory chip leadership, which suggests a low willingness to divert their own investments into the niche defence market.

However, there are a few examples of Samsung and SK Hynix collaborating with the defence ecosystem. Samsung, for instance, has cooperated with Hanwha Systems to produce gallium nitride (GaN)-based semiconductors used in T/R modules for the KF-21 fighter jet's AESA radar, and SK Hynix has engaged in joint development with the military for memory chips with reliable functionality in extreme environments. Both companies also supply semiconductors to critical infrastructure relevant to national security more broadly. For instance, Samsung Electronics produces radio frequency semiconductors for high-frequency signal processing and GaN-based power amplifiers for 5G/6G base stations and satellite equipment and terminals. They also produce power semiconductors based on compound materials, used in smart grid power conversion and distribution control, solar and wind power generation control, energy storage systems, and power inverters. SK Hynix, notably, supplies HBM for data centres and cloud infrastructure.[25] Still, based on discussions with South Korean government officials, neither

17 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.
18 Interview with South Korean government officials, 22 April 2025.
19 Interview with an international relations scholar at a South Korean university, 24 April 2025.
20 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.
21 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.
22 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.
23 Interview with South Korean government officials, 22 April 2025.
24 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.
25 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.

company is a significant supplier of goods or services to the defence ecosystem.[26]

South Korean defence companies do not rely only on foreign-designed chips. Many fabless[27] companies in South Korea design chips for overseas manufacture, and there are a few examples of defence semiconductors both designed and manufactured domestically. Hanwha Systems, for example, procures radio frequency semiconductors from the domestic company Wavice for its radar systems. There is also a plethora of South Korean companies designing AI chips, not least for generative AI (e.g., LLM inference), with potential military applications.[28] Important companies tied to Korea's military AI ambitions include FuriosaAI and Rebellions, two AI chip fabless companies, and Hanmi Semiconductor, which produces semiconductor manufacturing equipment.[29]

State-led push for self-sufficiency

Geopolitical and supply chain risks, the scarcity of domestic defence semiconductor production, and fears of deployment delays for AI-based weapon systems together incentivise the defence establishment to take policy action. The chief government authority for defence acquisition and military equipment development is DAPA. In September 2024, DAPA opened a new office for defence semiconductors to "serve as a dedicated agency for the systematic planning, management, evaluation, and certification of defence semiconductors."[30] Following this, in November 2024, the "Defense Semiconductor Development Strategy for Building a Strong Military through Advanced Semiconductors" (henceforth "the DSDS") was launched.[31] DAPA's sub-entity, the Korea Research Institute for Defense Technology Planning and Advancement (KRIT), will execute the strategy, the first of its kind in South Korea.[32]

The DSDS sets out the ambition to reduce the variety of defence semiconductors used in South Korean weapon systems. The goal is to develop standard defence semiconductors for broad use and base advanced weapon designs on them, to stabilise supply and demand. DAPA has identified seven categories of defence semiconductors used in South Korean weapon systems, based on both silicon and compound materials. These include semiconductors for high-power radio signals; key control and signal-processing functions; advanced computing and AI; space, aerospace and extreme environments; various types of sensors; and a broad category of semiconductors for power control, basic logic functions, and other essential roles that are found in almost all weapon systems. DAPA has also identified advanced packaging and heterogeneous integration, for combining these different chips, as crucial capabilities.[33]

The main aim of the DSDS is to enhance supply chain security for system semiconductors important to national defence, including both cutting-edge and legacy semiconductors. The vision is to establish an ecosystem for fostering a "high-tech semiconductor army", with extensive military AI capabilities, by 2030. KRIT leads a core group of experts from several organisations. These include weapon system specialists from the Agency of Defence Development (ADD, under DAPA), semiconductor experts from the Electronics and Telecommunications Research Institute (ETRI), the National Nanofab Center, and the Korea Institute of Machinery and Materials, as well as defence planning and reliability experts from KRIT itself and the Defense Agency for Technology and Quality (DTaQ, also under DAPA).[34]

A new legal basis required for state funding

Since the DSDS entails a new type of highly salient R&D projects, a new legal basis for prioritizing state funding to this particular aim within the existing defence R&D framework is required. Consequently, the National Assembly's defence committee, on 26 February 2025, proposed a "Bill on the Promotion and Support of Defense Semiconductors." As of August 2025, the bill is still pending enactment. The bill has eight key provisions. The first is to support the creation of a defence semiconductor industry ecosystem. The second is to establish a Defense Semiconductor Promotion Committee under the MND. The third is to mandate DAPA to survey domestic and international supply chains to

26 Interview with South Korean government officials, 22 April 2025.

27 "Fabless" (from fabrication and –less) refers to semiconductor companies that design semiconductors while outsourcing their manufacturing.

28 Interview with South Korean government officials, 22 April 2025.

29 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.

30 Defence Acquisition Program Administration, 첨단 AI 과학기술 강군 육성을 위한 새로운 이정표! ["A new milestone for fostering a strong military with cutting-edge AI science and technology!"], 20 September 2024, *https://www.korea.kr/briefing/pressReleaseView.do?newsId=156651382.*

31 첨단반도체 강군 도약을 위한 「국방반도체」 발전전략 [*Defense Semiconductor Development Strategy for Building a Strong Military through Advanced Semiconductors*], Defence Acquisition Program Administration, 19 November 2024, https://www.korea.kr/archive/expDocView.do?docId=41172.

32 Interview with South Korean government officials, 22 April 2025.

33 *Defense Semiconductor Development Strategy,* 11–5.

34 *Defense Semiconductor Development Strategy,* 16, 35.

monitor production capabilities, defence needs, risks and countermeasures. KRIT, which manages the DSDS, will oversee this work, helping to establish an information system for production management purposes and to facilitate private-sector technology transfer. The fourth provision is to mandate DAPA to promote comprehensive defence semiconductor R&D projects. The fifth is to establish priority procurement of domestically produced defence semiconductors. The sixth is to designate specialised companies for each category of defence semiconductors in order to facilitate targeted state support. This includes direct funding, cost sharing, technical support, and shared use of existing design and manufacturing infrastructure by integrating defence and civilian needs. Support measures also cover systems for intellectual property management, preferential procurement, and reliability certification for use in weapon systems. KRIT, in cooperation with agencies such as DTaQ, will coordinate these efforts to ensure efficient production and growth. The seventh provision is to designate and protect defence semiconductors as strategic technologies. The eighth and last provision is to vest ownership of outcomes of the DSDS in the state, for integrated management.[35]

Division of labour in the value chain

The DSDS implies the creation of comprehensive value chains, including R&D and chip design, wafer[36] fabrication, assembly, packaging, and testing. As for chip design, pure military-use semiconductors will be designed in-house at DAPA, and will be KRIT's main focus. Other designs will be developed through cooperation with the private sector, through the Ministry of Trade, Industry, and Energy (MOTIE), the chief government authority for both industrial policy and civil-military technology cooperation. There are many, probably more than 100, fabless companies in South Korea that could potentially get involved, and an R&D trial in cooperation with the private sector is already underway. If it proves unsuccessful, DAPA will design the chips themselves.[37] In May 2025, the first five development projects were announced, including space semiconductors for satellite communications, MMICs for unmanned aerial vehicles and radars, and various sensors.[38]

For wafer fabrication and packaging, the government's ambition is to designate a prime contractor from within the defence industry for each category of defence semiconductors. These companies will be the ones to integrate the defence semiconductors into weapon systems, and to decide what components or partial tasks to outsource to others. They will form consortia and choose their own supplier networks from, not least, private sector semiconductor companies. The government ensures that basic development capacity is in place; its focus will be to provide funding and support, and there is no state monitoring activity beyond Technology Readiness Level (TRL) 1–2. However, since defence companies lack experience and expertise in semiconductors, academia will participate in basic research (TRL 1–2), and research institutes will participate until TRL 3–4, equivalent to applied technology research (or even 5–6, equivalent to final stage development and commercialisation).[39]

Foundry infrastructure for defence-semiconductor wafer fabrication will be government-funded, and specialist support will be provided from various research institutes and universities under the Ministry of Science and ICT (MSIT) and MOTIE. The bifurcation of value chains is especially evident for silicon-based and compound semiconductors respectively. The aforementioned National Nanofab Center will take the lead on silicon-based AI semiconductors, and ETRI on compound semiconductors.[40] Both of these institutions are located in the city of Daejeon, an important defence-sector hub and upcoming cluster for defence semiconductors. MOTIE is also promoting the city of Gumi to become a cluster for defence semiconductors, as it already hosts many significant semiconductor companies, including SK Ciltron and LG Innotek.[41]

International cooperation is another component of the DSDS, despite the heavy focus on self-reliance. This includes not only joint R&D and design, but also manufacturing cooperation, presumably based in South Korea to meet domestic production goals. The goal is to achieve economies of scale by co-producing specific

35 [2208427] 국방반도체 육성 및 지원에 관한 법률안 ["[2208427] Bill on the Promotion and Support of Defense Semiconductors"], accessed 6 May 2025, *https://pal.assembly.go.kr/napal/lgsltpa/lgsltpaOngoing/view.do?lgsltPaId=PRC_Z2X5Y0W2X0W4W0E9C5D9B0C1A1L7L3*; *Defense Semiconductor Development Strategy,* 20, 24; interview with South Korean government officials, 22 April 2025.

36 Wafers are thin disks of semiconductor material used for chip fabrication.

37 *Defense Semiconductor Development Strategy,* 18, 20; interview with South Korean government officials, 22 April 2025.

38 군, 올 4분기 소형위성용 위성통신 우주 반도체 개발 착수 ["Military to begin development of satellite communications space semiconductors for small satellites in Q4 of this year"], *Newsis*, 19 May 2025, *https://n.news.naver.com/article/003/0013250011?lfrom=kakao*.

39 Interview with South Korean government officials, 22 April 2025.

40 *Defense Semiconductor Development Strategy,* 17; interview with South Korean government officials, 22 April 2025.

41 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.

semiconductors used in the same type of weapon systems for both parties involved. To incentivise international partners, central and local governments will offer subsidy support and tax benefits, in addition to emphasising South Korea's infrastructural and labour resources and domestic market demand.[42]

Civil-military cooperation with the private sector is a crucial part of the DSDS. The development of defence semiconductors for on-device AI hinges on private sector LLMs and big data. Attracting civilian talent to the defence semiconductor sector, and supporting civilian semiconductor companies in entering the defence market, are also part of the state's efforts. There is a public-private council for defence semiconductors, involving both defence and semiconductor companies, for information exchange on supply chain issues and technology trends, among other things. Moreover, the MND works to bridge the distance between the DSDS and other semiconductor industry plans from civil and military ministries, whereas MOTIE promotes infrastructure sharing through defence production in civilian semiconductor fabs and joint supply chain management of key materials with defence ministries.[43]

Initiatives beyond the new programme

Civil-military technology cooperation for defence semiconductor production goes beyond the DSDS itself. For instance, involved parties such as ADD and ETRI have previously jointly developed and produced AI semiconductors and low-power, high-reliability semiconductors for defence needs.[44] Moreover, as suggested above, there are various examples of cooperation between the civil and defence industries. Academia is involved as well. Several South Korean universities have research centres for semiconductor technology with defence applications. For instance, there is the Institute of Security Convergence at Korea Advanced Institute of Science and Technology, the Inter-University Semiconductor Research Center at Seoul National University, and various research centres at Pohang University of Science and Technology. Through research centres and other university–industry cooperation activities, academia contributes to fostering specialised talent and technology transfer.

South Korea has various types of state support for the semiconductor industry, with some impact also on defence production. Industrial policies, notably the K-Chips Act, promote the international competitiveness of South Korea's semiconductor industry and regional cluster development through tax reductions and other incentives.[45] Another piece of relevant legislation is the National Advanced Strategic Industries Act, which targets strategic industries such as the semiconductor industry with tax benefits, but also, for instance, support for talent development. As for AI chips more specifically, the AI-Semiconductor Initiative was established in response to the emergence of generative AI in 2022. The goal of the initiative is to establish a "sustainable ecosystem" for parallel growth of AI and AI semiconductors, and for South Korea to become a top-tier AI nation. It contains nine major technology innovation projects, one of which is the "K-On-Device AI Flagship Project," with a defence semiconductor subproject aimed at developing edge semiconductors for MUM-T operation and decision-making, and semiconductors for integrated networks and communications between command centres, manned-unmanned combined systems, and satellites. Moreover, since June 2024 there has been a "Presidential National AI Committee," which aims to promote public-private collaboration on AI semiconductors. It focuses on seven key industries, one of which is defence, and works with companies to identify opportunities for commercialisation of on-device AI.[46]

Moreover, South Korea's participation in international collaboration to strengthen civilian-use semiconductor production can ultimately contribute to domestic defence semiconductor production. MSIT has taken initiatives for international semiconductor R&D collaboration with the US and the EU. In the case of the EU, South Korea has participated in research for heterogeneous semiconductor integration within the scope of the Chips Joint Undertaking programme, under the European Commission, since July 2024. Another example is MOTIE's cooperation with the International Electrotechnical Commission to launch a "Semiconductor Standardization Forum" for international cooperation on standards, involving major companies such as Samsung and SK Hynix. Moreover, South Korea is a part of the US-led Fab 4, an initiative for semiconductor supply chain cooperation, which also involves Taiwan and Japan. However, this initiative was originally focused

42 Interview with South Korean government officials, 22 April 2025.

43 *Defense Semiconductor Development Strategy,* 16, 24, 37-8.

44 Interview with a security studies researcher at a South Korean research institute, 23 April 2025. ADD is also part of civil-military cooperation governance, next to MOTIE, through its own Institute of Civil-Military Technology Cooperation.

45 Embassy of Sweden in Seoul, *The South Korean Semiconductor Ecosystem*, 26 March 2023, UM2024/00804/SEOU.

46 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.

on cooperation and division of work, but the focus has, according to a security studies researcher, increasingly shifted to competition and bilateral cooperation, such as between Japan and the US, in ways that do not benefit South Korea.[47]

Challenges ahead for self-sufficiency

The chip design part, including R&D, of the DSDS production process is likely to be successful. There is design capability for all defence semiconductor categories within South Korea, and chip designers such as FuriosaAI and Rebellions are competitive. Moreover, the packaging part of the process is also relatively easy. The true challenge lies in wafer fabrication. As mentioned earlier, that part of the production process is characterised by high capital investments and low profitability, since several categories of defence and dual-use semiconductors within the DSDS will all be produced in small volumes. If combined with a lack of government funding, especially for building new manufacturing infrastructure in terms of fabs and required equipment, it will be difficult to incentivise private sector participation.[48] However, the growing importance of SMEs for military AI chip production is perhaps promising for the DSDS. If companies such as FuriosaAI and Hanmi Semiconductor can achieve profitability in niche product segments, where bigger companies lack sufficient incentives to participate, this could inspire other companies to get involved in defence semiconductors.

Self-reliance is an overall priority for South Korea's defence sector, suggesting there will likely be political support for state funding of domestic defence semiconductor production. Moreover, investments in defence R&D are regarded as having a positive economic impact for the broader economy, through technological spillover effects and employment opportunities.[49] At the same time, defence semiconductors are not necessarily prioritised over certain system-level industrial capabilities of more immediate concern. The main, bipartisan priority for South Korea's defence acquisition budget is to ensure capabilities for defending against North Korean nuclear weapons, drones, and missiles.[50]

On the face of it, South Korea's potential talent pool for defence semiconductors and military AI is considerable, considering the country's high educational level and large number of engineering graduates. However, the prioritisation of weapon system development might mean defence companies and their suppliers lack sufficient labour to engage in defence semiconductor production.[51] Simultaneously, South Korean semiconductor companies also report long-term issues with talent acquisition.[52]

During the IMF crisis in the 2000s, the government spent significant funds on infrastructure for ICT technology to alleviate the economic situation. Today, investing in AI is a hot topic and an important goal for the DSDS, but the government appears uncertain about areas with the greatest impact (infrastructure, human resources, or something else) in which to prioritise funding to achieve economic effects similar to those of 20 years ago. Defence companies requesting AI cloud infrastructure have been refused by the government because of the high costs. Furthermore, there is limited exchange of data between the government and firms. As an example, a lack of information sharing on ongoing defence acquisition projects even prevents civilian companies from participating in the defence market.[53] Moreover, according to a foreign business representative with insight in South Korea's defence sector, successful military AI requires advanced system integration capabilities, which is a weak spot for the South Korean defence industry[54]

It is also hard to accomplish long-term government commitment to certain investments. South Korea's presidential term lasts five years and cannot be renewed. Together with new administrations and new policies, previous commitments are often neglected. This also affects South Korea's credibility as an international partner for technology cooperation.[55] Market-based venture capital might be a better financial solution than government funding for South Korea's civil-military technology cooperation, but it presupposes prospects of finding markets for the technology products outside of the defence sector.[56] This might be difficult for defence semiconductors, which are not necessarily in line with commercial design priorities.

47 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.
48 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.
49 Interview with representatives of the South Korean defence industry, 21 April 2025.
50 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.
51 *Defense Semiconductor Development Strategy*, 24.
52 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.
53 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.
54 Interview with a foreign business representative with insight in South Korea's defence sector, 22 April 2025.
55 Interview with a security studies researcher at a South Korean research institute, 23 April 2025.
56 Interview with defence industry researchers at a South Korean research institute, 25 April 2025.

The government might not have sufficient knowledge of the difference between commercial and defence semiconductors to fully grasp the disconnect between the South Korean semiconductor industry's prowess in commercial semiconductors and the capabilities necessary to produce semiconductors for national defence. In addition, a large share of defence semiconductors consists of legacy chips, which might be even less attractive in terms of profitability and commercial use.[57] There are thus challenges ahead for the government in achieving active private sector participation in defence semiconductor production. In a way, the challenges discussed herein regarding South Korea's difficult path to defence semiconductor self-sufficiency, despite its world-class semiconductor industry, illustrate the risk of being misled by oversimplifying semiconductors as a "dual-use technology."

It remains to be seen whether intra-government cooperation will be efficient. Jurisdictional competition, where each ministry has its own funds and supply chains for civil-military technology cooperation, might pose an obstacle. Ministries, especially the MND, MOTIE, and MSIT, remain separated by walls.[58] DAPA, under MND, will need MOTIE's aid in achieving successful civil-military cooperation, but DAPA tends to want strict control over weapon system development. DAPA has very strict requirements for technology specifications, with limited flexibility regarding private sector realities and actual technological capabilities.[59] There appears to be a tension between strict rule adherence and the pursuit of self-sufficiency, and limited government–industry negotiation could further delay successful domestic development.

Conclusion

The DSDS is mostly about self-reliance in design, wafer fabrication, and packaging. These steps will probably achieve varying degrees of success. However, the semiconductor industry also depends on a wide range of input materials, equipment, and tools. In this respect, South Korea is highly unlikely to attain a high degree of self-sufficiency, except in selected materials and equipment.

Russia's war against Ukraine has highlighted supply risks for critical raw materials, including for semiconductors, in South Korea. Russia was previously an important source of such imports, whereas import dependence on China remains a complex issue. South Korea seeks international, multilateral cooperation to ensure stable and diversified raw material supplies, for example, from Kazakhstan and Australia.[60] If South Korea fails to secure diversified, stable, and reasonably priced raw material imports, domestic semiconductor manufacturing costs will rise, worsening funding challenges.

Furthermore, South Korea's ability to produce AI weapons is heavily dependent not only on foreign hardware but also on software, mostly from the US, which will be another self-reliance issue going forward.[61] South Korea's dependencies on the US go even deeper. Even if South Korea were to achieve the necessary domestic manufacturing capacity for defence semiconductors, it would still likely be dependent on certain manufacturing equipment from the US or equipment containing US-made components. The US has been known to use such dependencies to prevent third-country exports. Also, even if South Korea were to become self-sufficient in defence semiconductors and able to export purely Made-in-Korea weapon systems, the US attitudes toward such arms exports would still be a factor. The bilateral relationship with the US is paramount for South Korea's foreign policy. Self-sufficiency is thus a complex issue, not isolatable to individual policy areas, nor easily achievable for any single nation. South Korea's international dependencies for its semiconductor and defence industries will persist in some form.

Semiconductor technology is a top priority not only for South Korea, but also for EU and Swedish economic security policy. It is reasonable to assume that South Korea's experiences can provide inspiration to Swedish and EU efforts to reduce supply chain risks for critical technologies, especially for the defence sector. There may also be mutual and unexplored benefits for Sweden and South Korea to cooperate on defence semiconductors, e.g., in production or in the area of critical raw materials. After all, supply chain resilience is difficult to achieve without international cooperation.

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57 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.

58 Interview with defence industry researchers at a South Korean research institute, 25 April 2025.

59 Interview with defence industry researchers at a South Korean research institute, 28 April 2025.

60 Ibid.

61 Ibid.