Section A

Institution: University of St. Andrews

Unit of Assessment: UoA 19: Politics and International Studies

Title of case study: Enhancing Military Preparedness in Democracies

Period when the underpinning research was undertaken: 2013 - 2017

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Marc R. DeVore	Lecturer	01 August 2013 - present

Period when the claimed impact occurred: 2015 - 31 December 2020

Is this case study continued from a case study submitted in 2014? N

Section B

1. Summary of the impact (indicative maximum 100 words)

The accelerating pace of innovation poses deep challenges for democratic states, whose militaries must identify and reform obsolete weapons and organizational practices while their defense industries struggle to remain at the cutting edge of technological development. DeVore's research sheds new light on overcoming these challenges, enhancing military preparedness and weapons acquisition programmes in democracies. Specifically, DeVore's research findings have:

- Provoked an intense debate over the vulnerabilities and deficiencies of U.S. airborne forces, ultimately leading to over USD26,000,000 invested in long absent capabilities that have greatly enhanced their mobility and firepower. For example, in 2018, the US Army created a light armored company within the 82nd Airborne Division equipped with parachutable wheeled armored vehicles. In 2019, the Army then embarked on a programme to develop airborne tanks.
- Reshaped the USD16,000,000,000 Korean KF-X fighter jet programme to emphasize domestic strengths in electronics and flight control software while pursuing a range of international partnerships to reduce costs, create economies of scale, provide critical sub-component systems, and facilitate technology transfer. These changes have greatly mitigated the risks of unexpected cost escalations while increasing the likelihood of programme success (only 20-25% of all initiated combat aircraft programmes successfully develop a functional aircraft that is globally price competitive).

2. Underpinning research (indicative maximum 500 words)

DeVore's research contributes to critical debates on how modern democracies can best provide for their security. The accelerating pace of technological innovation poses deep challenges to both military organizations and domestic defense industries. While the former struggle to recognize and reform obsolete capabilities, the latter face nearly insurmountable economic obstacles to producing cutting edge weapons by themselves. DeVore's research findings shed new light on why military organizations so often resist change, focusing on the deficiencies of modern airborne forces. His findings also illuminate how states can navigate international armament collaborations to both maintain the autonomy of their domestic defense industries while pooling resources with select partners to stay at the cutting edge of technological development.

(1) Why militaries resist change: Airborne Forces

Scholars have long noted that technological innovations and societal developments render older

capabilities obsolete. To remain competitive, military institutions must adapt and change. Yet all too often, they fail to do so. DeVore's research analyzes *why* militaries continue to invest resources and personnel in obsolete weapons, units, and operational concepts that no longer enhance battlefield performance. The answer centers on organizational autonomy. Militaries often establish independent services, branches, or units to explore new technologies and doctrines. While initially beneficial, these sub-units become powerful actors that later defend their weapons and practices against future innovation, leading to wasted resources.

Devore's monograph, *When Failure Thrives*, demonstrates these dynamics with respect to paratroop formations in the US, UK, and Soviet Union **[R1]**. By the 1970s, improvements to air defenses combined with the global proliferation of tanks rendered large-scale airborne operations all but suicidal. Yet these militaries continued to pour resources into large paratroop units, in counterproductive ways, precisely because those units had the power and autonomy to resist change. In the US case, this led to problematic deficiencies: airborne forces remained organized into overly large units, were extremely vulnerable to artillery, and lacked proper mobility and firepower once on the ground.

(2) Balancing domestic arms production with international collaboration

Governments also struggle to navigate the rapid pace of contemporary technological change and its implications for defense spending and procurement. Only great military and economic powers like the U.S. and China have the resources to independently stay at the cutting edge of military technology. Prior research suggested that all other governments must choose between producing outdated weapons domestically or becoming subcontractors within large international collaborations.

DeVore's research argues that this is a false and dangerous dichotomy. The increasing complexity of weapons has made self-sufficiency in arms production unattainable (perhaps even economically ruinous) for most states, making international collaboration necessary **[R2]**. Yet, giving up independent domestic defense industries would also be catastrophic for military performance. These industries possess skills and experience that allow militaries to adapt their weapons to changing battlefield conditions and unanticipated threats **[R3]**.

Governments must thus strike a balance between domestic arms production and international collaborations to avoid the downsides of doing either alone **[R4, R6]**. How they strike this balance is a fraught process without a one-size-fits all solution. Indeed, the states that fare best match their strategies to both their existing economic institutions and the necessities of the particular weapons programme being developed. For example, where research and development costs are high and production requires large economies of scale, governments should seek out international partners. However, they should ensure that their partners share similar firm/state relations to facilitate useful cooperation **[R4, R5]**. Governments should also choose collaborations that protect the existing strengths and comparative advantages of their domestic defense industries **[R2]**.

3. References to the research (indicative maximum of six references)

The underpinning research was published as: a monograph with the U.S. Army Press, internationally prestigious peer-reviewed political science journals, and in an edited volume by a nationally reputable South Korean publisher.

[R1] DeVore, Marc. 2015. *When Failure Thrives: Institutions and the Evolution of Postwar Airborne Forces*. Fort Leavenworth, Kansas: US Army Combat Studies Institute. https://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/WhenFailureThrives.pdf

[R2] DeVore, Marc. 2015. "Defying Convergence: Globalisation and Varieties of Defence-Industrial Capitalism." *New Political Economy* 20(4): 569-593. DOI: 10.1080/13563467.2014.951612

[R3] DeVore, Marc. 2017. "Commentary on the Value of Domestic Arms Industries: Security of Supply or Military Adaptation?" *Defence Studies* 17(3): 242-259. DOI: 10.1080/14702436.2017.1347781

[R4] DeVore, Marc and Moritz Weiss. 2014. "Who's in the Cockpit? The Political Economy of Collaborative Aircraft Decisions." *Review of International Political Economy* 21(2): 497-533. DOI: 10.1080/09692290.2013.787947

[R5] DeVore, Marc. 2014. "Producing European Armaments: Policymaking Preferences and Processes." *Cooperation & Conflict* 49(4): 438-463. DOI: 10.1177/0010836714525052

[R6] DeVore, Marc. 2016. "Producing British Airpower: Neo-Liberalism, Collaboration and Contemporary Aerospace." In Chung-in Moon et al, eds., *Korea's Search for Sustainable Air & Space Power Strategies*. Seoul: Oreum Publishing, 75-111. *(Available upon request.)*

4. Details of the impact (indicative maximum 750 words).

Between 2015 and 2020, DeVore's research findings have enhanced national security in democracies by improving military preparedness and weapons acquisition programmes. Specifically, DeVore's research on how the accelerating pace of technological innovation poses deep challenges to both military organizations and domestic defense industries has:

- Provoked an intense debate over the vulnerabilities and deficiencies of U.S. airborne forces, leading to reform initiatives to improve their mobility and firepower. These ultimately resulted in the 2018 creation of a light armored company within the 82nd Airborne Division equipped with parachutable wheeled armored vehicles and a programme to develop airborne tanks, launched in 2019—reflecting an investment of over USD26,000,000 in restoring and improving capabilities absent for over three decades.
- Led the Korean KF-X fighter jet programme to adopt a more collaborative approach with an increased number of international partners—to benefit from economies of scale, shared research and development costs, and technology transfers—while still protecting domestic strengths in electronics and flight control software. These changes have greatly ameliorated the risks of unexpected cost escalations while enhancing the likelihood of producing a functional combat aircraft that is globally price competitive.

(1) Reforming U.S. Airborne Forces

DeVore's research findings on the vulnerabilities and deficiencies of U.S. Airborne Forces, stemming from their organizational resistance to change, sparked an intense debate within the U.S. Army which ultimately led to concrete reforms—improving the mobility and firepower of paratroop units. The *Army Times*, widely subscribed to and read by army personnel, published an extended exposé and in-print debate on the future of U.S. airborne forces, based on the findings of *When Failure Thrives* **[R1]**, with several leading decision-makers within the army agreeing with DeVore's findings, including a retired Colonel, retired General, and a senior analyst with the Center for Strategic and Budgetary Assessments **[S1, p.3-4, 9]**. The Army Press deputy director notes that DeVore's study "*stirred considerable controversy within the U.S. Army. Staff researchers for the U.S. House of Representatives Armed Services Committee contacted me to ask further questions about the monograph which they had used to deepen their understanding of Army capabilities and prepare their members for policy discussions… Even those advocates of Airborne forces who disagreed with DeVore's message took away from his work the key insight that paratroopers must proactively work to reform themselves*" **[S2]**.

These debates then catalysed a reassessment of U.S. airborne forces and proposals for their reform and modernization. For example, analysts with RAND (an important U.S. defence think tank), cited DeVore's findings on the unrealistically large size of airborne units, their extreme vulnerability to enemy fire, and their lack of ground mobility (i.e. vehicles) **[S3, p.1-2, 7]**. They then proposed re-envisioning the role of airborne forces around small-scale missions such as combatting terrorism and evacuating foreign nationals during emergencies, while also equipping paratrooper units with armoured vehicles and light armour **[S3, p.4-5, 7-8]**. Similarly, the *Military Review* published a proposal that would overcome these same deficiencies by reorganizing

airborne assault capabilities around small reconnaissance squadrons equipped with light armoured vehicles **[S4, p.93-94]**.

The U.S. Army ultimately embraced some of these proposed reforms, congruent with DeVore's research findings that airborne forces lacked adequate firepower and mobility, while being overly vulnerable to artillery **[R1]**. "*The Army has, in the years since the publication of DeVore's monograph, sought to rectify airborne forces' shortcomings. Perhaps most impressive has been the Army's efforts to address the lack of tank and anti-tank capabilities that DeVore had criticized*." **[S2]** In 2018, the Army created a light armoured company within the 82nd Airborne Division, equipped with parachutable wheeled armoured vehicles—an investment of over USD26,000,000 in vehicle procurement alone **[S5]**. As the Director of the US Army Combat Studies Institute attests, *"recent developments in the force structure of the US Army's airborne forces indicate that thinking officers took some of [DeVore's] arguments to heart… two of the US Army's five airborne brigades incorporated 'Stryker' light armored vehicles to their organic arsenals. The Stryker… will add a completely new dimension of protection to airborne forces, mitigating the historically vulnerable infantry forces' greatest weakness"* **[S6]**. In 2019, the Army then embarked on a project to develop airborne tanks to provide even greater firepower and mobility to its airborne units **[S5]**. *"The US Army's Combat Capabilities Development Command continues to refine its search for a light-weight air-droppable tank to accompany parachute forces on a forced-entry mission"* **[S6]**. These initiatives represent the first time that U.S. airborne forces would have armoured vehicle capabilities since the 1990s, when the last of their tanks were retired from service, and the first new research and development on airborne tanks since the 1960s.

(2) Shaping Technology Acquisition in South Korea's Air Force

DeVore's research findings on balancing domestic arms production with international collaborations—particularly leveraging global partnerships to overcome high research and development costs and create economies of scale while cultivating domestic production strengths **[R2, R4-R6]**—has shaped how South Korea's government has pursued its K-FX fighter jet programme. Combat aircraft are one of the most sophisticated weapons systems to produce, with many expensive and technologically advanced sub-component systems that are difficult for states to develop comprehensively on their own. Historically, over 75% of combat aircraft development initiatives have failed to produce a functional aircraft that is globally price competitive. Only six successful programmes currently exist. Despite these odds, the South Korean Air Force initially launched its estimated USD16,000,000,000 fighter jet programme—the largest armaments project ever undertaken in South Korea—with high ambitions for self-sufficiency and only one partner, Indonesia.

DeVore was initially invited to share his research during the 2015 National Air Power Conference by two concerned Korean academics, who in 2017 became the National Security Advisor and Vice-Foreign Minister to the newly elected Korean government. This launched a period of sustained engagement where DeVore routinely participated in dialogues with Korean policymakers and Air Force officers on the difficulties of developing an indigenous fighter jet programme, including three additional National Air Power Conferences and seminars/workshops with government funded think tanks such as the Korea Institute for Defense Analysis, the Sejong Institute, the Institute for National Security Studies, and the East Asia Foundation **[S7, S8]**. DeVore was further granted a consulting contract on aerospace development with South Korea's Agency for Defense Development, beginning in 2016 and still ongoing **[S9]**.

Through these engagements, DeVore's research findings reshaped the KF-X fighter project in key ways. Consistent with the importance of sharing costs and creating economies of scale **[R4, R5]**, Korea has begun actively pursuing many more global partnerships, either as full co-developers or to provide difficult sub-components. As the Project Head for Korea's Aerospace Technology Transfer Programme at South Korea's Agency for Defense Development attests, "*Devore's research on leveraging global partnerships to overcome high research and development costs emphasized to us the importance of expanding our set of partners and*

obtaining high cost sub-systems from them" **[S10]**. The South Korean National Security Advisor elaborates that, "*Our government has thus gone to great lengths to preserve its co-development partnership with Indonesia when that later country's financial problems led it to question whether to continue the project. We have also sought new partners, unsuccessfully negotiating a co-development partnership with Turkey and more successfully seeking focused technological arrangements with Israel and India*" **[S11]**. At the same time, to protect existing strengths and comparative advantages **[R2]**, Korea will focus on domestically developing important aspects of the flight control software and electronic systems. Indeed, the agreement with Israel also provides for technology transfer so that Korea can eventually develop their own expertise in aerospace radar. According to the First Vice Minister of Foreign Affairs, "*Dr. DeVore's emphasis on the need for an activist state to overcome technological bottlenecks encouraged our Agency for Defense Development to proactively 'target' key technologies for either domestic development or acquisition through international partnerships*" **[S12]**. The Project Head for Korea's Aerospace Technology Transfer Programme further attests that "*these changes—more international partnerships, globalizing our supply chain, and seeking out technology transfers—are mitigating the risks of unexpected cost escalations and increasing the likelihood of the project becoming a success*" **[S10]**.

5. Sources to corroborate the impact (indicative maximum of ten references)

[S1] *Army Times* article, 'Does the Army Need Airborne?,' 29 February 2016.

[S2] Letter from the Editor of the Army University Press, a retired Colonel.

[S3] RAND commentary via War on the Rocks, 'Reimagining and Modernizing U.S. Airborne Forces for the 21st Century,' 20 April 2016.

[S4] *Military Review* article, 'The Use of Reconnaissance Squadron during Joint Forcible Entry,' March-April 2016.

[S5] Media coverage of the 2018 creation of a light armored company within the 82nd Airborne Division with parachutable wheeled armored vehicles and the subsequent airborne tank development programme.

[S6] Letter from the Director of the US Army Combat Studies Institute.

[S7] Article from Forbes magazine, '"Blessing or Curse"? Korea Faces Daunting Question: To Build or Not to Build Its Own Jet Fighter," 13 July 2015.

[S8] Collated programmes from the National Air Power Conference and think tank seminars and workshops.

[S9] Consulting agreement with South Korea's Agency for Defense Development.

[S10] Letter from the Project Head for the Aerospace Technology Transfer Programme at the South Korean Agency for Defense Development.

[S11] Letter from the National Security Advisor to the President of the Republic of Korea.

[S12] Letter from the First Vice Foreign Minister, Ministry of Foreign Affairs, Republic of Korea.