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# The Impact of Population Dead Cross Phenomenon on the SECURITY of the Korean Peninsula

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#### Abstract

**Purpose:** This article examines the potential impacts on the security of the Korean Peninsula(KORPEN) due to the slumping defense workforce in the depopulation and aging era and suggests the impact of the Population Dead Cross Phenomenon(PDCP) to be a considerable factor for the future direction of the ROK-U.S. combined defense system.

**Method:** As a research method, the framework of analysis is to examine the impact of the PDCP and the DPRK military threats on the security of the KORPEN then recommend the future direction for improving the alliance relations in the era of Operational Control Transition(OPCON-T). Due to the limitations and characteristics of this research, this study focused on literature research, official documents from the Republic of Korea(ROK) government and the Ministry of National Defense(MND), academic and dissertations, forums, and seminars related to the demographic and national security studies.

**Results:** The Republic of Korea is the most rapidly advancing country globally, with a low-birth rate and hyperaging society. The PDCP in the ROK society is a serious security concern to its conscription-based system. Onlookers expect the low fertility rate to shake the national defense policy of the conscription system by causing a decrease in the working-age population and a mission-critical decrease in the available national defense workforce. The continued reduction of the ROK defense manpower may raise questions about how to effectively command the future combined defense forces after OPCON-T.

**Conclusion:** In a broader sense, the decline of the ROK population due to the PDCP is a social problem that desperately needs an essential solution. This social problem is also a reflection point for the ROK and the U.S. defense and national authorities, developing the future direction for the ROK-U.S. combined defense system. If the chronic diseases of the PDCP are ignored, it will directly threaten the security of the KORPEN. The ROK and the U.S. should consider multifaceted factors from various angles and prepare for binational decision space to prepare for the realpolitik in shaping the future landscape of the ironclad ROK-U.S. military alliance.

[Keywords] Population Dead Cross Phenomenon, Future ROK-U.S. Combined Defense System, ROK-U.S. Military Alliance, ROK Conscription System, Operational Control-Transition

# **1. Introduction**

The Republic of Korea(ROK) is the most rapidly advancing country globally, with a low-birth rate and hyper-aging society[1]. The low-birth and hyper-aging trends are doomed to increase the slowdown of economic growth and welfare demand. These two trends will limit the enhancement of national defense power and securing the required defense budget due to its manpower challenge. This could cause a significant setback to the ROK-U.S. military alliance safe-guarding the security of the Korean Peninsula(KORPEN). Furthermore, the Population Dead Cross Phenomenon(hereafter PDCP) occurs when the number of newborn is smaller than the

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number of the deceased, leading to a decrease in the overall population. As seen in industrialized countries and a geographically near-peer, Japan, declining child births and an aging society may lead to a shortage in the civilian and military workforce and a consumption decline, causing dwindling production/consumption, and ultimately the ROK's national security status.

The impact of low-birth rates on the security of the ROK is of great interest in the academic community. Prior research raises the issue of reducing the conscription resource from the national defense managerial perspective. Kwan-ho Cho and Gil-sun Hong<sup>[2]</sup> researched the direction and key tasks of defense human resource management according to the change of Korean military structure based on the Military Reform 2020. Byung-ook Choi[3] recommended the future direction and challenges of the Korean Military Service System. Jong-ha Kim and Jae-Yub Kim<sup>[4]</sup> also suggested a plan for strengthening military preparedness during the ROK-US Military command structure reorganization process. Elizabeth H. Stephen<sup>[5]</sup> highlighted policy concerns of low fertility for military planning in the ROK, while Byung-duk Kim highlighted national policy tasks for the aging Society. Byung-ook Choi and Chang-hee Park[6] also addressed policy issues for establishing elite reserve forces in a low-birth and aging society. Sung-ho Sheen and Heeyong Yang<sup>[7]</sup> researched on the implication of the low-birth rate and aging society from the defense budget perspective. Jong-rok Yoon and Hyung-chul Kim[8] also suggested response strategies to secure the elderly welfare budget due to changes in the ROK elderly population. The overall focus of the prior research has been on the re-organization of the ROK conscriptionbased military service system caused by the Defense/Military Reforms. Such changes were driven by the low-birth and aging societal challenges in terms of defense budget, elderly welfare budge, and national policy tasks.

As described above, the prior research generally emphasized the importance of national defense manpower due to the low-birth and aging population and identified the innovation of the military command structure unilaterally from the ROK's perspective. Therefore, a research on finding developmental direction suitable for the dynamic security environment of the KORPEN while examining the characteristics of the PDCP from binational standpoint has been somewhat insuffi-cient. Furthermore, the relationship between the PDCP and OPCON Transition(OPCON-T) has not been considered in prior academic research. In this respect, this paper examines the potential im-pacts on the security of the KORPEN due to the slumping defense workforce in the depopulation and aging era and suggests the impact of the PDCP to be a considerable factor for the future direction of the ROK-U.S. combined defense system. The policy promotion and organizational practice are insufficient from the alliance perspective even though the population projection data<sup>[9]</sup> and the world total fertility rate data<sup>[10]</sup> by social welfare experts revealing the potential side effects of the PDCP, could seriously impact the security of the KORPEN. Therefore, the practical direction of the future ROK-U.S. combined defense system that the beneficiaries can experience will be proposed. The scope of this study was limited to the developmental direction of the ROK-U.S. military alliance by focusing on its complementary relationship safeguarding the security of the KORPEN against the Democratic People's Republic of Korea(DPRK) military threats.

As a research method, the framework of analysis is to examine the impact of the PDCP and the DPRK military threats on the security of the KORPEN then recommend the practical future direction for improving the binational military alliance in the era of OPCON-T. Due to the limitations and characteristics of this research, this study focused on literature research, official documents from the ROK government and the ROK Ministry of National Defense, academic and dissertations, forums, and seminars related to the demographic and national security studies. This paper consists of the following. First, chapter 2 defines the PDCP by examining the lowbirth and hyper-aging situation with the ROK population estimate data and the global fertility rate data. Then, I will explain how the mid-to-long term reduction in the conscription resources could become a serious security concern. Next, chapter 3 examines the combat strength of the DPRK that threatens the security of the KORPEN and explains the structure and function of the current ROK-U.S. combined defense system in peacetime and wartime. Finally, chapter 4 explains potential impacts to the combat readiness posture of the future ROK-U.S. combined defense system due to the PDCP and, in chapter 5, recommends the future direction for improving the alliance relations from binational perspectives while reaffirming potential threats due to the PDCP and ever-increasing DPRK military threats.

## 2. What is the Population Dead Cross Phenomenon(PDCP)?

The population of a country is the basis of its national power or its state development. Therefore, the low fertility rate has a direct connection to the fate of a nation. Furthermore, the national economic and military powers are closely associated with the population because the defense workforce and production/consumption manpower are contingent on the population[11]. The ROK population trend cannot be reversed in the short- or mid-term. Thus, the constraints on staff, as well as the budget, must address the conditions facilitating the ROK military's pursuit of its long-term strategy and missions.

According to 2020 World Population Status report, the ROK is the only country with a total fertility rate of less than one among the 37 member countries of the Organization for Economic Coop-eration and Development(OECD), meaning that a majority of women do not have even one child during their reproductive years. The ROK has been advancing low-birth and hyperaging more rapidly than any other country in the world. Since 1983, the ROK has been experiencing low-birth rate at a population replacement level(Total Fertility Rate of 2.1) for the past 30 years[12]. Moreover, at the end of the year 2019, the PDCP has emerged, in which the number of deaths exceeds the number of births for the first time, affecting the overall population. The PDCP, in which the population naturally declines ahead of the number of births, is a shockwave that came nine years earlier than the ROK government forecasted in 2016, affecting virtually all areas of its economy. This phenomenon results from a steady decline in births, falling below 300,000 for the first time last year. On the other hand, the number of deaths was 305,100, an increase of 10,000(3.4%) from the previous year, the highest since 1970 when the data was first compiled[12]. The ROK is the only country with a difference in population between generations since the Korean War(1950-1953).



Figure 1. Total fertility rates in Korea are the lowest in the OECD.

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A structure in which a few young people support many older people will inevitably impede economic growth. As a result, onlookers expect an increased shortage of military personnel and exhaustion of the national pension fund. In addition, as the aging phenomenon overlaps, the working-age population aged 15 years and older will decrease, accelerating low economic growth, and even the existence of the country is expected to be in jeopardy. Experts point out that natural population decline can lead to a shortage of working-age people in the mid-to-long term, undermining the potential growth rate and national competitiveness[13]. The slowdown in economic growth and the increased welfare expenses through the PDCP will cause severe pressure on the national finances. In particular, it will become an essential constraint on military spending and increase. Such extreme demographic changes will put the ROK at an intersection between national security and social security.

Amid the DPRK's nuclear weapon development, the ROK knows the importance of national de-fense better than any other country. With the support of the people, successive governments of the ROK have been investing a lot of effort and budget to increase national defense capabilities for self-reliant defense potential. The problem is that the demand for social welfare expenses due to the aging population, which has been in full swing since the 2000s, is expected to impact the defense budget significantly starting 2030. Additionally, the conscription recruitment of military personnel will become a significant challenge. The decrease in the number of young men will bring a change in the current ROK conscription system. As a result, maintaining an army-centric military of 600,000 becomes impossible and the ROK forces has started shrinking since 2017. According to population projections, the population of 20-year olds is 330,000 in 2020 to 230,000 in 2025, then 160,000 in 2040, and so forth. Even if the size of the troops is reduced to 300,000 based on the current defense reform, the newly enlisted soldiers are expected to be 200,000 each year, considering an 18-month service term. Therefore, it would not be easy to maintain sizable troops starting in the year 2025 [14]. As the number of conscripts to serve in the ROK military decreases, there is no alternative but to extend the service period again to maintain the current defense manpower under the current paradigm. However, extending the period of mandatory military service once shortened will bring about significant social resistance. As a result, unless the government and politicians are willing to extend the service period, the number of ROK military forces will inevitably decrease in the future. Also, the decline in economic growth, tax revenue, and increase in welfare costs will pressure the ROK government finances invested in defense spending. Thus, in the long term, the ROK's military force reduction will significantly impact the ROK-U.S. combined defense system. Without a definite alternative, the ROK's situation casts doubts in its ability to lead the combined defense effort and fulfill its core missions due to defense budget and manpower shortages in the era of OPCON-T.

# 3. The ROK-U.S. Combined Defense System and the Security of the KORPEN in the Era of OPCON-Transition(OPCON-T)

The CFC, a symbol of the ROK-U.S. combined defense system, was established on November 7, 1978, to respond to the rapidly changing situation around the KORPEN, supplementing the with-drawal of the U.S. ground forces from the ROK and improving the ROK-U.S. combined operational capability[14]. The ROK-U.S. combined defense system is responsible for the security of the KORPEN during wartime under the command and control of the ROK-U.S. Combined Forces Command(CFC)[15]. For more than half a century, the U.S. stationary forces on the KORPEN led to deter, but the defense capabilities were always designed to come from the off-pen. The OPCON-T signifies the ROK military's intention to implement autonomous defense capabilities with the U.S. bridging and enduring role.

Both countries have been pursuing an establishment of a new alliance military structure suitable for the latest security environment of the KORPEN[16]. During the 46th ROK-U.S. Security

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Consul-tative Meeting(SCM), both countries agreed to three conditions for the OPCON-T: 1)the ROK mili-tary's acquisition of key capabilities, 2)development of the ability to counter the threat of DPRK's nuclear weapons and missiles, and 3)the security environment around the KORPEN. They further agreed that, the Future Combined Forces Command(F-CFC) would be led by a four-star general from the ROK military, rather than the U.S. military. The OPCON-T implies that the ROK military will occupy a bulk of the total force across all domains in charge of the defense of the KORPEN in the future. In other words, the ROK military will lead most of the critical missions directly related to the deterrence and victory of the war. The ROK military will also prioritize various military operations and policies during peacetime and wartime, including an overall military strategy and detailed operational plans. The ROK-commanded F-CFC will lead the primary core missions to prevent a kinetic conflict on the KORPEN in peacetime and effectively defend enemy wartime aggression. The role of the U.S. military will change to an extended deterrence function through forward stationary forces that augments for the shortcomings of the ROK military's combat capabilities [17].

The ROK's conventional deterrence strategy is to prepare for the threat of an all-out war perpe-trated by the DPRK[18]. The CFC focuses on maintaining the defense line at Military Demarcation Line(MDL) at the beginning of the DPRK's all-out invasion. The war plan dictates that the Korea People's Army(KPA) takes the initiative with asymmetric weapons systems, including nuclear missiles, and occupies the KORPEN before the deployment of U.S. augmentation forces[19]. Such a strategy may expose vulnerability to the DPRK's asymmetric threats, including raids and local provocations and weapons of mass destruction(WMD). Whether the U.S. military's large reinforcements are capable of deploying to the KORPEN on short notice could also be a challenging task. The most viable support that can quickly answer the call is the U.S. forces stationed in Japan providing access to their staging bases and support structures for the inbound augmentation forces. However, it is contingent on the diplomatic relations between the ROK, the U.S., and Japan[20]. The nature of DPRK's provocations will also determine the level of probable support that the F-CFC may desperately requires during the road-to-war.

The 2018 ROK Defense White Paper states that within the 1.28 million DPRK troops, its special forces account for 15.6% of the total, or 200,000[21]. In the event of a conflict on the KORPEN, the DPRK would likely utilize the full array of its asymmetric military capabilities in the hopes of achieving a decisive early advantage that would bring about a quick end to the conflict on terms favorable to the DPRK. These massive DPRK Special Forces are highly trained soldiers capable of undertaking reconnaissance, infiltration, sabotage, and assassination missions [22]. The reason that the DPRK is strengthening its special warfare capability is its will to carry out various types of asymmetric warfare by infiltrating into the rear area of the ROK using tunnels during the crisis. The DPRK will likely use special warfare units to support its main force's offensive operation and disrupt the rear area to engage in acts of sabotage and inflict physical and psychological damage against the ROK populace and could be called upon to deploy WMD including biological and chemical weapons. Historically, the DPRK has used its special forces to engage in acts of lowlevel aggression and coercion outside of wartime scenarios, including an attempted decapitation raid on the Blue House in the 1960s and Rangoon bombing in 1983. The terrorism of the conventional KPA with the "hit and run" tactic will also try to instill fear and anxiety in the ROK populace and the international community by attempting political and diplomatic coercion to secure the initiative in domestic and foreign issues.

The DPRK possesses up to 60 nuclear weapons and has a maximum of 5,000 tons of biological and chemical weapons, ranking third in the world. The DPRK's WMD program is perhaps the most threatening factor to the security of the KORPEN. The chemical weapons weighing about 2,500 to 5,000 tons, the world's third-largest and biological weapons containing 13 types of pathogens, cannot rule out the possibility that the ROK can instantly be neutralized despite its far more ad-vanced national economic and military defense potentials. In addition, the DPRK can load WMD on long-range cannons with a maximum range of 50 to 60 km aimed at the Greater Seoul Metropolitan Area(GSMA), and Toksa, Scud, and Nodong ballistic missiles that are capable of hitting any targets south of the MDL[23]. Even if the F-CFC could rapidly be activated to deploy in securing the GSMA, the DPRK's force of 8,800 field artillery and 5,500 multiple rocket launchers will put the ROK-U.S. combined defense system and its missile defense efficacy and large stockpiles of munitions to the ultimate test. The DPRK has been steadily developing its weapons systems to make up for shortfalls of the conventional legacy weapon systems. In 2020, the DPRK claimed a successfully test-fired a new Submarine-Launched Ballistic Missile(SLBM) including Long-Range missiles such as Musudan, KN-08/14, and Taepodong-2[24]. In 2021, the DPRK unveiled a new tactical guided missile, the KN-23, called a 'monster missile,' which can produce significant nuclear-level destructive power with its 2.5-ton non-nuclear warhead armed with conventional high explosives. Recently, the DPRK claimed a successful test-fired newly developed hypersonic missile after claiming a successful test-fired from railwayborne missile launching system. The three-axis system that the ROK has been unilaterally preparing for missile defense against the DPRK is likely to be vulnerable to these recent developments.

Under the DPRK fertility promotion policies, incentivizing citizens with free health care, additional ration, and patriotic recognition that all interpreted as an auspicious sign of national prosperity helped the DPRK's military force reaching 1.30 million troops after the 1950-1953 Korean War. Up until early 1970s, the DPRK maintained an active duty force of 300,000 and they did not grow their size of the force until mid-1970s due to its investment in military advancement after realizing the U.S. military technological superiority. The DPRK began adjusting their military portfolio to include all forms of WMD, plus the artillery, ballistic missiles, and special forces required to offset the U.S. military presence on the KORPEN. According to Global Fire Power's latest report<sup>[25]</sup>, the DPRK received high praise for the number of launchers, self-propelled artillery, submarines, frigates, corvettes, and fighter jets. However, according to the Bank of Korea's analysis of major economic indicators for North and South Korea in 2020, the DPRK's nominal Gross National Income(GNI) is 55 times behind the ROK's GNI [26]. In other words, the ROK obviously could have far more advanced military technologies with unmatched defense budget. Although the DPRK possesses many conventional military forces, it uses outdated weapons that are technologically inferior to those of the ROK and the U.S., but with one caveat of approximately strong-willed 840,000 DPRK troops always are on stand-by for an all-out invasion within the border area of the MDL. The population of the GSMA in 2020 is 25.96 million, which is 50.1% of the ROK's national population, and the concentration of population in the metropolitan area is deepening. The history tells us that once the DPRK takes the capital as a hostage, they know too well that they will gain a political and military advantage that enables favorable unification conditions on the DPRK's terms.

The last threat to the security of the KORPEN posed by North Korea is perhaps the sudden change of the DPRK regime. The collapse of the regime due to instability can translate into a direct threat and ambiguity to the security of the KORPEN. As the collapse of the DPRK becomes a reality, many refugees will also surge in the border areas between China and Russia, thereby creating a pretext for their military intervention into the Korean conflict [27]. The massive refugee surge on the KORPEN will further exacerbate the existing humanitarian crisis by an unimaginable order of magnitude, and third party intervention could instantly turn the KORPEN into a battleground by regional powers escalating into a regional conflict. Therefore, the ROK-U.S. combined defense system should not simply aim to fight well and win in case of the DPRK attack—instead, focus on prevention and deterrence by maximizing readiness during peacetime and interagency crisis response capabilities regarding Non-combatant Evacuation Operations(NEO) during the crisis escalation. Moreover, it would also be commendable to develop combined post-conflict stabilization and reconstruction capabilities. All of which requires readily accessible manpower, appropriate defense budget, and realpolitik communication.

The ROK military should select and prioritize mission capabilities that it can efficiently develop in the face of the DPRK's threats while considering the impact of the PDCP to its manpower. As an example, it is reasonable to consider continuous support of the intelligence-gathering and striking 'critical target' capabilities by the U.S. As the PDCP pressures the ROK government finances, it could be a burden for the ROK military to lead all the core mission functions. The PDCP will hinder the ROK military from securing the necessary, sustainable, and fully operational defense manpower to endure unwavering operational competencies to deter a potential conflict independently and carry out its five core missions without interruption. In addition, the impacted defense budget caused by the PDCP will be a major roadblock to the ROK and the U.S. defense authorities to limit acquisition of the essential capabilities to meet the Conditions-Based OPCON Transition Plan(COT-P). This statement does not overlook the implications of the OPCON-T. Such implications have the specific goal of developing the level of the ROK military capabilities to deter and protect the security of the KORPEN. However, the ROK's PDCP situation will likely impose severe constraints on improving its overall defense capabilities that ultimately will translate to either delay or advance the OPCON-T prematurely jeopardizing the security of the KORPEN in case of the DPRK's attack. Therefore, the future direction needs to contemplate whether the framework of the ROK-led combined defense system is on the glide path to impenetrable war deterrence and powerful retaliatory capabilities while scrutinizing the impacts of the PDCP.

# 4. The PDCP Effect on the ROK-U.S. Combined Defense System

The PDCP in the ROK society is a serious security concern. While some of these demographic changes are elevated in academic discourse, British military magazine IHS Jane's Defense Weekly focused on the ROK's fertility rate as a serious problem. Especially, this low fertility rate is a serious security concern for a nation that relies on conscription. The pundits expect the low fertility rate to shake the national defense policy of the conscription system by causing a decrease in the working-age population and the available defense workforce. Furthermore, the continued reduction of the ROK defense manpower may raise questions about its capability to effectively lead the F-CFC.

Starting in 2025, the ROK would have a difficult time maintaining adequate number of troops to support its current force structure. It is alarming that this will become a significant obstacle to the future ROK-U.S. combined defense system in the face of the OPCON-T. For decades, the combined defense system has relied on the ROK to contribute 90% of the peacetime forces. This is at risk now with planned force reduction from 650,000 to 300,000. As of December 2020, the DPRK's military has reached 1.30 million active-duty troops in peacetime. By 2032, this number will roughly be over four times that of the ROK-U.S. combined defense system. The DPRK does not have same PDCP issues; therefore its force size is expected to remain the same. The ROK has adopted the conscription system to supplement its military forces since 1957. The conscription system has following disadvantages. First, it causes inefficiency in human resource allocation by failing to consider individual strengths. Second, it causes a problem on national growth such as the opportunity cost of mandatory military service by segregating productive population for 18 months. Additionally, the sharp drop in the defense workforce raises another issue in developing elite military funded by advanced technologies. The current system has difficulty in mastering required combat skills due to the short 18-months service period, particularly the cutting-edge defense technologies for modern warfare require synergetic human operators until the era of full-automation arrives. Hence, the retain-ability to operate such advanced technologies in such a short service obligation period will question the validity and efficacy of the current conscription system. As a result, the ROK military will have no choice but to change its military service system in the near future. The question is whether primarily invested defense technologies can be efficiently operated and managed by a shrinking conscript-centered defense workforce with the short service period.

The Defense Reform 2.0 follows cutting-edge technological platforms and capabilities that need desperate measures for the effects-based validation with practical battle-proven fielding.

The fully unmanned/automated defense system with minimum human resourcing is an unprecedented case, and even the world's most potent military powers are at developing stages of fully automated defense capabilities at this moment in time[28]. In other words, "Are these artificial defense capabilities reliable, flexible, and affordable to mitigate any vulnerability caused by the lack of human operators due to the impact of PDCP?" Also, the importance of human security is at its highest as a non-traditional threat(COVID-19) lately, which adds more complexity to the future direction of the ROK-U.S. combined defense system when the ROK desperately needs to fulfill binational-agreed COT-P through the combined military training and exercises. In order to minimize any potential gap in defense readiness due to the natural population decline, it is necessary to form a consensus between the ROK and the U.S. on the future direction of the combined defense system with the following caveats:

1. The ROK military should aim at developing elite reserve forces to efficiently marshal available human and material resources to support military operations. The current system needs improvement on the effectiveness of establishing a robust mobilization support and training system. As more than 3.1 million reservists are receiving training annually, various evaluations, complaints, and criticisms about the reservist training appear in various forms through many media outlets. The ROK reserve forces, organized and trained for the industrial age, "mass-army warfare," where inefficiency masked by the mass, are not optimized to support the digital age, "multi-domain war-fare." This large proportion of the ROK reserve forces is under-utilized and overlooked defense human resource, which could serve as a potential stopgap solution to the ROK defense manpower dilemma. They make up an important share of the country's defense capacity in wartime. The ROK reserve forces are the only substantive option to make up for the shortfalls in troops reduction due to the PDCP. Given the importance of the reserve forces, changes and innovations in reserve force training and mobilization management are inevitable. Until the ROK military service system finalizes its way ahead, the reserve forces could provide rapid mobilization of overwhelming force to take the war to the enemy only if the ROK military could maintain the well-trained reserve forces.

2. The future ROK-U.S. combined defense system requires active war deterrence and retaliatory capabilities as rapid and decisive as possible to minimize potential damages caused by the DPRK provocation and aggression. The ability to destroy the enemy's threat capabilities as quickly as possible can be transferred to a successful strategic paralysis, minimizing the chance of the DPRK's tension escalation on the KORPEN. In other words, the future combined defense system must be prepared to secure survivability in a DPRK invasion and veto the occupation of the capital and es-sential areas. Therefore, the ROK-U.S. combined defense system needs accuracy and speed that can overtake the DPRK's "hit and run" tactic. The future combined defense system can be embodied in six mission capabilities to deter war in peacetime and achieve victory in wartime [29].

Items	The future combined defense mission capabilities
1	Collect and analyze information to identify an enemy's military activity
2	Hold the front line / defend against the enemy's seize of the critical terrains
3	Deter and secure enemy access to military force through sea and airspace
4	Subdue enemy's diplomatic, informational, and economic center of gravity
5	Counterattack and to annihilate an enemy whose invasion ability is depleted
6	Shape the information environment to prevent Third Party Intervention

 Table 1. Six mission capabilities of the future combined defense system[30].

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The ROK and the U.S. are actively preparing for the COT-P to expand the ROK's autonomous response capabilities to the DPRK threats and establish a new combined defense system led by the ROK military. The ROK's transition to wartime OPCON to lead the combined defense and the alliance's comprehensive defense capability to respond to the DPRK threats is through the three-step combined verification process of the mission performance capability of the F-CFC and the non-traditional threat such as COVID-19 crisis, downgrading the scale and scope of the combined command post training, further handicaps our opportunity to fully implement and assess the three-step combined verification process. As the invisible depopulation war is consuming the workforce, both the ROK and the U.S. should focus on developing core mission capabilities that the shrinking ROK military workforce can lead. In contrast, other critical capabilities should be put on hold until a more definitive solution is realized. Therefore, the ROK military should be able to lead defense and counterattack missions in the early stages of the war before the U.S. and United Nations Sending States(UNSS) reinforcements arrive. The ROK military should have abilities to lead in the following area:

Items	Operational core mission competencies
1	Gathering intelligence on DPRK military activities south of Pyongyang and Wonsan
2	Responding and counterattacking the enemy's aggression and local provocations
3	Adhering and defending the main front lines
4	Securing sea and airspace through the navy and air force
5	Subduing the enemy's main force by Joint fire support of land, sea, and air forces
6	Dominating offensive/defensive cyber and information operations

 Table 2. ROK military-led operational core competencies after the OPCON-T[30].

Once the OPCON-T completes, the future combined defense system will provide a foundation for the ROK military to lead those six mission capabilities. Thus, the ROK military should be responsible for at least 70-80% of the troops and military assets required to achieve the primary missions of identifying, dealing, and suppressing enemy targets for deterrence and execution of the war on the KORPEN. However, it is expected that the PDCP will hinder the ROK military from securing the necessary and fully operational defense manpower to endure unwavering operational competencies to deter a potential war independently and carry out its core missions without interruption due to the manpower shortage. The decline of the ROK population due to the PDCP is a social problem that desperately needs an essential solution[30]. This social problem is also a reflection point for the ROK and the U.S. defense and national authorities in the era of OPCON-T. If the chronic diseases of the PDCP are ignored, it will directly threaten the security of the KORPEN. The ROK and the U.S. should consider multifaceted factors from various angles and prepare for binational decision space to prepare for the realpolitik in shaping the future landscape of the ironclad ROK-U.S. military alliance.

# **5.** Conclusion

The future ROK-U.S. combined defense system is likely to be at disadvantage if the ROK military fails to lead the core mission competencies in the early stage resulting in loss of the initiative to conduct war. Losing initiative will go beyond the security of the KORPEN and ultimately leads to a significant security threat in the Northeast Asia[31][32]. If the ROK military is unable to lead the future combined defense system during peacetime and wartime, which will make the ROK reliant on the international community to end the Korean conflict on their behalf, thereby increases a perception of incompetency of the ROK military on the international stage. As the world witnessed during the 1950-1953 Korean War, the KORPEN could potentially be a powder keg that geopolitically embeds the possibility that great powers can clash. Therefore, the ROK military needs to be honest with itself and concludes whether it can fully manage the core mission in active war deterrence and independently take major responsibilities for the security of the KORPEN. The current campaign of an elite force powered by advanced technologies has risk factors that should thoroughly be realized in terms of realpolitik and practicality.

The defense manpower must be available for these dedicated tasks to be possible. The drastic reduction in the ROK defense workforce will gradually aggravate the overall combined operational competencies. In other words, it will lead to a situation where more U.S. commitment is inevitable, causing a potential dilemma in allies, partners and friends defense resource allocation and prioritization in the time of need. The possibility cannot be ruled out that such impending situation may set the U.S. and the UNSS for failure to answer a mission-critical call for the time-sensitive reinforcing deployment. It could lead to a fracture in the ROK-U.S. military alliance and the loss of trust in the U.S. partnership. Moreover, it will jeopardize the security of the KORPEN. Even after the OPCON-T, the missions that the U.S. military should continue to lead are the striking 'critical target' mission to suppress the DPRK's centers of gravity and the provision of a nuclear umbrella for the strategic deterrence. The ROK and the U.S. should consider multifaceted factors from various angles and seek a reasonable and collaborative approach. As a result, the ROK military could focus on the effects-based mission competencies that ensure interoperability without a ticking time bomb due to the PDCP dilemma; there is room to rethink the future direction for the ROK-U.S. combined defense system in era of the OPCON-T, but we may not run out of time in the very near future.

When the ROK and the U.S. are systematically and actively preparing for the OPCON-T implementing ways to slow down the impacts of the PDCP, the verification and developmental procedures of technological prowess should not be driven by the political agenda that may jeopardize the future security of the KORPEN. Instead, bilateral efforts should continue developing calibrated and practical designing of the future ROK-U.S. combined defense system while combating the invisible depopulation war with concrete alternatives. As an example, the ROK-U.S. military alliance could become more international and multilateral by adding collective security domains to the ROK's New Southern Policy(NSP) and the U.S. INDOPACOM Strategy operations, activities, and investments(OAI). Furthermore, the alliance can use the United Nations Command(UNC) as a springboard to jump start multilateral security cooperation by drawing more partners to distribute the burdens of the PDCP. The ROK-U.S. military alliance has been forged in the crucible of combat and has been the linchpin of peace and security in the Northeast Asia for many years. As prior research suggested that the well-trained and managed reserve forces may delay the shortfalls of the future ROK-U.S. combined defense system due to the defense manpower challenge; however, it will not be a permanent solution since the overall population is still on decline. Both the ROK and U.S. should consider the practical timeline of the OPCON-T in prudent manner while revamping an elite reserve forces system suitable for the security situation of the KORPEN until binational decision space is secured for designing the realistic future landscape of the interoperable alliance. Even as strong as the U.S. military power is, the U.S. has never fought wars alone, instead, have been fighting with many allies. Both countries should establish the future direction for the ROK-U.S. combined defense system with an attitude of "a stitch in time saves nine" rather than playing it by ear. The ROK-U.S. military alliance can overcome the PDCP by considering mid-to-long term solutions and be prepared to continue safeguarding the security of the KORPEN just as it did for the last 70 years only if they "look before they leap" for another century of maintaining the ironclad ROK-U.S. alliance.

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# 7. Appendix

# 7.1. Authors contribution

	Initial name	Contribution				
		-Set of concepts 🔽				
		-Design 🗹				
		-Getting results 🔽				
		-Analysis 🔽				
		-Make a significant contribution to collection 🗹				
Author	55	-Final approval of the paper <i></i>				
Addition	55	-Corresponding 🔽				
		-Play a decisive role in modification <a>Image</a>				
		-Significant contributions to concepts, designs,				
		practices, analysis and interpretation of data $\ oxdot$				
		-Participants in Drafting and Revising Papers 🛛				
		-Someone who can explain all aspects of the paper $\overline{\!$				

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# A Study on the Development Plan of Rapid Acquisition System of the ROK ARMED Forces

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#### Abstract

**Purpose:** A rapid demonstration acquisition project has been underway since 2020 to compensate for the shortcomings of the current weapon acquisition system, which usually takes more than 10 years to acquire a single weapon system, and to quickly apply fourth industrial revolution technologies such as AI, drones, and unmanned technology to the defense sector. As it is applied first without institutional completeness, however, various problems are being exposed at the site. In this study, we would like to diagnose the causes of these problems and suggest solutions.

**Method:** Quantitative research on rapid acquisition demonstration projects is limited due to the short history of implemented and policy-based systems, so qualitative research was conducted to improve the efficiency of the current rapid acquisition project. The causes of problems between the implementation of the system were analyzed, and through laws and regulations related to it and the examples from the U.S. military, a solution that could be accepted by the agencies involved in the rapid acquisition demonstration project was presented.

**Results:** To mitigate the responsibility of organizations and personnel implementing the rapid demonstration acquisition project on-site and to boldly implement the project, a solution was presented to ensure necessary conditions. The burden on quality assurance and loss & damage of equipment was reduced and the property registration process of equipment under test operation without property registration was presented. It was also proposed to promote rapid research and development by breaking away from the purchase of current commercial products to ensure the completeness of the rapid acquisition demonstration system.

**Conclusion:** The rapid demonstration acquisition project is to first test-use commercial products applied with new technologies and quickly introduce them to the military through formal decisions if they can be used militarily. As we have taken the first step through a lot of research and discussion, we hope that the system will be supplemented and implemented boldly and challengingly to meet the original purpose and establish it as a viable and sustainable formal weapon system acquisition procedure.

[Keywords] Rapid Demonstration Acquisition Project, Weapon System Acquisition Procedure, Defense R&D, Force Integration, Defense Budget

## 1. Introduction

Since its first establishment in 1972, the Korean military's defense acquisition system has been improved quantitatively and qualitatively through eight system reforms and 27 amendments to the defense force development directive[1][2][3][4]. Pursuing two objectives of the timely force integration of the weapon system required by the military and the transparency of the acquisition process has led to complicated and slow decision-making procedures, ironically resulting in delays in force integration. Figure 1. Weapon system acquisition procedure.



As shown in <Figure 1>, a complex process is carried out from "requirement institution" to "force integration" before a single weapon system is acquired. In addition, the acquisition period may be significantly delayed compared to the initial plan due to limited reflection of the defense mid-term plan and budget and difficulty in overcoming technical limitations between R&D and test evaluation. It usually takes more than 10 years to acquire a single weapon system, thereby limited in reflecting the trend of advanced technology development in the private sector.

In response, the rapid demonstration acquisition project has been institutionalized and implemented since November 2019 through a lot of research and discussions to overcome the problems of the current weapon system acquisition procedure and to quickly apply the emerging fourth industrial revolution technology to the weapon system[5][6][7]. The rapid demonstration acquisition project is a system in which private products with new technologies are purchased and quickly introduced through the determination of the requirements if military utilization is recognized through pilot application by the military. Although there are still many things to be lacking in completeness as a system, 16 projects were selected by securing the budget in 2020, and pilot operations have been underway in earnest since the end of 2020 after receiving equipment from suppliers. Visible results are being produced such as confirming the possibility of force integration as some of the equipment has been recognized for military utilization.

However, a number of practical issues are being exposed in the actual application of this system to related policy-making departments and the field[3][4]. For example, there are difficulties in using existing organizations to perform additional tasks because there are no dedicated personnel and organizations for the implementation of rapid acquisition demonstration projects. In addition, to properly implement the purpose of the rapid acquisition demonstration project, it is necessary to boldly and actively operate the pilot equipment to verify military utilization, which is often difficult due to the fact that the operating unit and operators are liable when the equipment is damaged. Therefore, it is necessary to drastically supplement the current system to solve real-world grievances of institutions and pilot management units that are implementing rapid acquisition demonstration projects. Accordingly, this study aims to diagnose the problems that arise in the actual application of the rapid acquisition system and present measures for improvement.

## 2. Theoretical Background

There have been many efforts to overcome the rigidity of the weapon system acquisition process based on transparency and to quickly acquire the weapons system. Among them, the representative system is ACTD, or Advanced Concept Technology Demonstration, a project that develops a weapons system with a new concept of operational management capability within three years using mature technologies. ACTD was established as a system for rapid prototype development using private sector technologies, but its effectiveness gradually decreased due to the complexity of securing budgets(unit projects, National science & technology council review, etc.) and rigorous military practicality assessment. <Table 1> shows the status of ACTD tasks and decision-making required that have been pushed[8][9][10][11][12].

Description	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	Total
Projects launched	3	4	5	5	8	3	0	1	1	0	0	0	30
Projects completed	0	1	3	4	3	6	4	0	0	1	0	1	23

Table 1. ACTD project status.

Since 2014, few projects have been launched, no budget has been drawn up in 2021, and only 10 out of 17 cases that have been judged to be possible to develop or mass-produce weapons systems at the end of the project have been actually implemented. The main cause of ACTD's failure was the absence of institutional strategies leading to implementation after the project was completed and the rapid acquisition was restricted by existing acquisition procedures even if the decision was made.

To overcome these shortcomings of ACTD, the Enforcement Rules of the Defense Projects Act(2021.1) and the Defense Force Development Order(2021.4.) were amended to lead to an urgent requirement decision after the end of the pilot operation. The reason for the existing urgent requirement was limited to emergency situations such as war, overseas dispatch, enemy infiltration, provocations, or terrorism, but the addition of "when the military utilization of new technologies is confirmed through demonstration application" has enabled rapid acquisition. <Figure 2> illustrates the acquisition procedure and duration of rapid demonstration acquisition projects.

Figure 2. Procedures for obtaining a weapon system by a rapid demonstration acquisition project.



The rapid demonstration acquisition project is a system in which, within the budget of the year (about 30.3 billion won as of 2021), cutting-edge technologies are applied, test-operated for 6 months, and quickly purchased as an urgent requirement if military usability is confirmed. As it can be determined as emergency requirements. As urgent requirements can be determined, precedent study and requirement verification can be omitted, and the total cost of the project is limited to less than 50 billion won to exempt the feasibility study, so the period of force integration can be reduced significantly and implemented within two to three years [13][14][15].

# **3.** Problems of the Current Rapid Demonstration Acquisition Projects and Improvement Plans

## 3.1. Lack of professionalism in quality assurance

Defense Acquisition Program Administration(DAPA) classifies equipment supplied by the

rapid acquisition demonstration project into categories similar to those of overseas purchase businesses and requires the relevant military unit to guarantee quality. Accordingly, the reality is that for equipment delivered to the military, delivery and quality inspection are carried out by operators of the pilot operation unit who have no expertise in the equipment and quality assurance. Many long-term weapon systems, which are force-integrated through strict quality inspection by Defense Agency for Technology and Quality(DTaQ), are also experiencing problems when inspected by the relevant military unit, then it is questionable whether commercial products directly delivered from suppliers without quality assurance by third party experts to field units will be properly guaranteed [16][17].

The ROK Army piloted "small unmanned aerial vehicles for long-range reconnaissance" and "vertical landing fixed-wing drones" as part of a rapid demonstration acquisition project. However, after the delivery inspection of the pilot operation unit, several accidents occurred due to engine failure during training for the operator. This is a natural result of the delivery inspection, which takes place without understanding the technical characteristics of the equipment in a short period of one to two days.

The Quality Control Regulations for Defense Projects stipulate that the quality guarantees shall be replaced by delivery inspection by the required military unit on equipment that is difficult to standardize or does not require standardization. As a supplementary measure for this, a system is established in which DTaQ under DAPA conducts a sort of "quality assurance" procedure by going through a factory acceptance test and the required military unit conducts acceptance tests[18][19].

For equipment acquired through rapid demonstration acquisition projects, if a consultative body is formed consisting of DAPA, DTaQ, and the required military unit to participate in quality assurance activities by visiting the suppliers before delivery to conduct a factory acceptance inspection and by conducting the delivery inspection, the anxiety and concerns will be resolved. If DAPA, which has a good understanding of suppliers and equipment, DTaQ, which is a quality assurance expert, and the required military unit, which will operate the equipment in the field, show collective intelligence, it will be able to remove anxiety related to accountability issues and create a positive synergy effect.

## 3.2. Unclear method and timing of property registration of pilot operation equipment

Military supplies require property registration. However, in the case of test-run equipment, it was purchased with a defense improvement budget, but has yet to be registered as property of DAPA or the require military unit because it has not been classified as an official weapons system. As it is not clear who is the "owner" of the equipment, it is inevitably lacking the sense of ownership and accountability, and no one is responsible for the loss or damage of equipment, leading to the limitations of management. For example, the first pilot equipment, the long-range small reconnaissance unmanned aerial vehicle, fell and was completely destroyed, but the loss could not be processed because there was no owner in the document.

<Figure 3> shows the property registration process for military supplies and equipment introduced through the defense budget. In the case of weapon system introduced through defense improvement costs, the national stock number will be assigned by the DAPA specification & catalog team. Subsequently, the team registers the equipment in the comprehensive defense standard information system and sends the listed data to the logistics command through the ROKA G-4 requirement resource department, enters the result of the functional classification into the defense logistics integrated information system, and finally registers the equipment as the property. In the case of a force support system introduced through force operation costs, the required unit will be given a national stock number or a temporary stock number through DAPA and registered as property through the same procedure above.





It is expected that it will be possible to shorten the registration period and efforts if the problem of linking the comprehensive defense standard information system and defense logistics integrated information system is resolved in the future.

In the case of rapid demonstration acquisition project equipment, it has not been classified as a weapon system yet, but it is considered desirable to follow the existing weapon system registration procedure since it is purchased through defense improvement costs. So, the national stock number or temporary stock number is registered in the system by the specification & catalog team of DAPA and is registered as property of the required unit based on this.

Although it seems reasonable to give a temporary management number or temporary stock number because the rapid acquisition pilot equipment lacks the purpose of repetitive procurement, it is more effective to give a national stock number considering that it should be registered and managed as a formal property after the end of the pilot operation. Since DAPA's internal review recently concluded that it is possible to assign national stock numbers to equipment for rapid demonstration acquisition projects, a way to register them as property through the same procedure as the existing weapon system has been paved.

The next problem is when the property is registered. According to DAPA guidelines, the pilot operation equipment will be handled according to the military supplies and munitions process of the requirement military after the end of the pilot operation, and the military supplies and munitions management law states that the weapon system obtained by DAPA is transferred to each relevant unit when the delivery was completed. Therefore, it is not clear when the equipment should be registered as required military property, and the pilot operation is still underway without properties registration.

If registered as the property of the required unit according to the military logistics management law when they are delivered, the management entity will be clarified, but there will be a problem of handling unused equipment after the end of the pilot operation. It also involves calculating the limitations of economic repairs, related administrative burden, and efforts to manage inventory costs and to store until disposal. Above all, in the case of equipment with high economic residual value even though it has no operational effect, it is difficult to decide to dispose of it, which is expected to be kept by the test operation units. On the other hand, if only necessary assets are registered as property of the required unit at the end of the pilot operation according to the rapid demonstration acquisition project guidelines and the rest are disposed of by DAPA, administrative efforts and inventory costs can be reduced.

There will be no problem managing the property if it is registered as the property of DAPA and used by the required unit during the pilot operation period through a lease contract. Furthermore, for equipment to be scrapped because of its lack of military usability, institutional support is needed to ensure that a military usability review committee can make a decision without burden at the end of the pilot operation and support follow-up measures for decommissioning under the supervision of the Ministry of Defense or DAPA. As another approach, to reduce the administrative requirements of property registration and to operate economically, it is also worth considering renting equipment from the supplier during the pilot operation[20][21].

#### 3.3. Operator's responsibility for loss of pilot operation equipment

If the equipment is lost or damaged during the pilot operation, it is required to be held liable for compensation in accordance with the commodity management and accounting-related acts. Although the purpose of the pilot operation is to verify that the equipment has military-grade performance and operability, if the operator is liable for compensation when the equipment is in trouble, it will result in storage, not utilization.

For example, in the case of a long-range small reconnaissance unmanned aerial vehicle, the operator crashed during manual modification of the route during pilot operation, and the accident investigation and loss were to be carried out according to the relevant law, but the case is still pending because the property was not registered. The test operation unit and operator were greatly disappointed by this, and if they were to clear their responsibility for damage or loss of equipment in the future, it would lead to a passive and complacent operation, which would result in something that is far from originally intended.

Therefore, an institutional mechanism should be in place for test operation units and operators to operate freely from liability for reimbursement. If the results of the loss are notified to the Ministry of Economy and Finance and the Board of Audit and Inspection, they can be persuaded. There is enough logic and it would be possible to draw consultations between ministries.

Another way is to provide loss immunity for pilot equipment. In the case of a pilot project for outstanding commercial products conducted by the Ministry of National Defense, it is protected by relevant orders. The equipment for the rapid demonstration acquisition projects shall be relieved of the burden on the required unit by preparing an exception clause for loss of or damage to the equipment in the defense force development orders as in the case of superior commercial products[22].

If the law makes it difficult to deal with loss, it is necessary to consider accidents during normal operation more proactively to exclude them from the list of deliberations on loss(Article 21 of the Order on Operation of Military Equipment Inspection Committee). In addition, by shortening the service life of the equipment, the economic residual value should be reduced and compensation should be reduced even if the loss is inevitably handled. For example, in the case of a small reconnaissance strike complex drone or self-destructive unmanned drone that is piloted in 2021, it cannot be reused once it is used. If such pilot operation equipment is used in its entirety during the pilot operation period to establish the concept that it does not leave residual value, the operator will be able to reduce the burden.

# 3.4. Exclusion or simplification of test & evaluation after requirement decision

For equipment that has been determined to be required through pilot operation, it is suggested that the test & evaluation should be omitted or reduced to shorten the force integration period. The background of this opinion is that the performance of the equipment has already been verified through military usability checks during the pilot operation period, so it does not need an extra test & evaluation and concerns that it will be difficult to obtain it quickly unless it passes a strict test & evaluation.

It should be kept in mind that the test & evaluation is not an obstacle to force integration, but a final verification process that guarantees the life and safety of soldiers operating weapon systems in the field. Rather, unlike general weapon system acquisition procedures that are developed over a long period of time, rapid demonstration acquisition projects that purchase commercial goods should be further strengthened for the following reasons.

First, there is a clear difference in the content and strength of military usability verification and test assessment. The test assessment evaluates performance satisfaction(major required operational capability, technical and additional performance), unity and interoperability (interlinkability and information exchange, information protection, etc.), military operational suitability, force integration support element satisfaction, and practicality. The military usability check is to check whether the performance suggested by the supplier in the operating environment, the convenience of operation and control, and matters necessary for force-integrating the equipment. It becomes difficult to secure the feasibility, validity, and objectivity of test & evaluation by omitting or greatly simplifying test & evaluation based on military usability verification.

Second, it is highly likely that equipment used during pilot operation and equipment subject to test & evaluation will not be the same. If the pilot operation equipment is unrivaled due to its high technical skills, it is likely to be the same as the test & evaluation equipment, but if not, the pilot operation equipment supplier and the actual force integration equipment supplier may be different. In addition, even if it is the same supplier, the force integration equipment is changed according to the required performance of the military and is completely different from the test & evaluation, so it is not something to be omitted or simplified.

Third, the pilot operation period is six months, with limited evaluation of three seasons, including cold and hot weather, while the test & evaluation is required to conduct a three-season test evaluation. In the case of a long-range small reconnaissance unmanned aerial vehicle, it identified the problem of falling several times due to severe cold weather during pilot operation from December 2020. However, if the same equipment was delivered in the summer and tested, it is possible that this problem could not be identified.

Omitting or simplifying test & evaluation based on military usability verification increases the burden on the required unit to verify military usability, and it is necessary to conduct an appropriate level of test evaluation according to the fundamental purpose of the test & evaluation. In addition, it is deemed desirable to establish a mutual consensus and share responsibility if the committee of the rapid demonstration acquisition project consisting of DAPA, ROK JCS, and the requirement military decides on the necessity and method of implementation.

# 3.5. Providing company proposals to the requirement military for performance verification

According to DAPA's guidelines, it is required to check the performance suggested by the suppliers when checking military usability, but most suppliers are refusing to disclose the proposal due to business secrets. Therefore, the performance is checked based on the request for proposal issued by DAPA.

The contents of the proposal request presented by DAPA and the proposal submitted by the company are bound to be different. Due to the nature of open competition, most suppliers are likely to present better performance than those specified in the proposal request. In the case of competition between suppliers that do not yet have the right technology, it may be lower than the performance provided in the proposal request. In this situation, the requirement military(test & evaluation group), which has to verify performance based on DAPA's guidelines, will inevitably be burdened with the results of not fulfilling the guidelines. In response, DAPA needs

to include the proposal of the supplier in the special conditions of the contract and provide it to the requirement military. However, the supplier's proposal should be specially managed to prevent leakage of business secrets that the supplier is concerned about and the responsibility for the leak should be clarified.

# **3.6.** Promotion of rapid R&D projects to overcome the limitations of rapid purchase projects

As the rapid demonstration acquisition project has been underway for two years, many suppliers are participating. In particular, large defense industry companies are also applying for businesses with interest from this year. <Table 2> shows the number of projects presented by the company for two years and the current status of being selected as a pilot operation target. 16 projects were selected in 2020, 11 in the first half of 2021, and additional projects will be selected within budget later this year.

Number	Area	Total	2020	2021	Number of projects selected
1	AI/intellectualization	35	28	7	3
2	Hyperconnection	27	22	5	3
3	Cloud	0	0	0	0
4	AR/VR	11	10	1	0
5	Individual combat system/wearables	24	21	3	1
6	CPS/precision control	2	1	1	0
7	High-tech bio	0	0	0	0
8	High-tech cyber/blockchain	0	0	0	0
9	Futuristic protection		25	5	2
10	Big data	3	3	0	0
11	11 Autonomous/unmanned devices/robotics		17	24	3
12	2 Drones		34	7	11
13	High-tech propulsion/energy		16	3	1
14	High-tech materials/sensors/processing	49	20	29	3
	Total	282	197	85	27

Table 2. Status of application and selection of suppliers for rapid demonstration acquisition projects.

Compared to 2020, the number of applications for the project is decreasing overall, and 27 out of 282 cases(10%) are selected as pilot projects, making it difficult to select equipment that can be used for military purposes. In addition, there are cases in which the selected projects are canceled in the evaluation stage of the proposal or fail to pass the delivery inspection due to lack of performance implementation.

Due to the need to choose from the equipment already developed in the private sector and the poor performance of equipment for military use, the number of projects targeted will gradually decrease over time, which is expected to lead to doubts about the effectiveness of the rapid demonstration acquisition projects. In order for the rapid acquisition system to continue to develop, the rapid R&D system must be introduced along with the current rapid acquisition demonstration project(purchase system). Private commercial products that can be force-integrated immediately are acquired under the current system and the performance is continuously expanded, but private initiatives or defense R&D achievements that need to be modified and developed are promoted as rapid R&D projects[23][24][25].

Figure 4. Procedures for obtaining weapon systems through rapid R&D projects.



<Figure 4> shows the procedure for obtaining weapons systems by rapid R&D projects. The rapid R&D project is a system that develops prototypes that apply new technologies to existing weapons systems through short periods of R&D(1-3 years) to check military usability and link them to military requirements. So the weapon system that the military needs can be force-integrated in a timely manner and many tasks are expected to pour out in the future. However, in order not to follow in the footsteps of ACTD, an institutional system that connects equipment that is recognized for military utilization is essential for rapid demonstration acquisition projects[26][27][28][29][30].

# 4. Conclusion and Suggestions

The main problems and measures for improvements of the rapid demonstration acquisition project currently being implemented have been examined. As the rapid demonstration acquisition project was implemented to compensate for the long-term and outdated problems of acquiring weapon system, it needs an institutional device that allows policy practitioners and operators of pilot units to work with ease. Contrary to the good intention of making weapon system incorporated with cutting-edge technologies timely, it will be difficult to guarantee the sustainability and success of the rapid demonstration acquisition project if the poor system imposes disadvantages on individuals participating.

In order for the rapid demonstration acquisition project to successfully settle down and establish itself as a new paradigm for acquiring weapon system, the following efforts are needed. First, it is necessary to take measures to reduce the burden on units and personnel participating in the system so that the project can be selected and piloted without following the frustration of existing acquisition procedures. Second, it is necessary to generate performance that can be force-integrated and operated in a short time so that expectations for new acquisition procedures do not emerge as concerns. Third, in order to actively embrace changing science and technology, we must boldly challenge even if the success rate is slim, and we need support to tolerate the attempt even if it fails. Fourth, it is necessary to expand the scope of current rapid demonstration acquisition projects for commercial products that have already been developed in the private sector to supplement the rapid acquisition system so that prototypes can be developed and force-integrated through research and development using high-tech.

It is hoped that the rapid demonstration acquisition project, which is based on concerns and passion from various stakeholders, will take into account the failure of ACTD in the past and establish itself as a feasible and sustainable formal weapon system acquisition procedure beyond the current pilot stage.

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# 6. Appendix

# 6.1. Authors contribution

	Initial name	Contribution
		-Set of concepts 🔽
		-Design 🔽
Lead	ЦК	-Getting results 🔽
Author	TIK	-Analysis 🗹
		-Make a significant contribution to collection $ igside S$
		-Final approval of the paper 🛛
		-Corresponding 🔽
		-Play a decisive role in modification $\ igside{ u}$
Corresponding Author*	WK	-Significant contributions to concepts, designs,
	VVIC	practices, analysis and interpretation of data $\ igside {\cal Q}$
		-Participants in Drafting and Revising Papers 🛛
		-Someone who can explain all aspects of the paper $ igveedow$

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# A Study for the Development of a New Concept of Reserve Forces as a Total Force in the ROK MILITARY

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#### Abstract

**Purpose:** This study is to reveal the limitations of the existing concept and recognition of the reserve force by analyzing the actual situation and policy of the reserve force. In addition, by establishing a new concept of the reserve forces based on the total force, and suggesting the direction for the modernization and force integration of mobilization-oriented units, it is intended to contribute to the expansion of national security in the future.

**Method:** The research method is to conduct a single case study that provides a framework for understanding and interpretation in decision-making and execution of the reserve force reinforcement policy. An interpretive case study will be conducted to analyze the process of forming the total force of the United States(US), focusing on the case itself rather than the theory. Also, for a qualitative study through archival research, reports from the US Department of Defense and Congress, historical data of the National Guard, research papers and publications published by the ROK Ministry of National Defense(MND) and Army, and domestic and foreign papers will be reviewed.

**Results:** According to the total force policy of the 1970s, US viewed the reserve force as a companion force of the standing army and promoted the reinforcement of its forces. And the successful innovations in the structure, organization, and training of reserve forces by the Military National Defense(MND) and the Army of U.S. in the 1960s supported this policy. However, the strength and readiness of the Reserve Forces of ROK have not improved significantly compared to the past in terms of structure and organization, training system, and budget.

**Conclusion:** The concept of a reserve forces should be extended from a combination of mobilized personnel and materials to a unit composed of them. First of all, efforts should be focused on improving the operational capability and effectiveness of the mobilization-oriented units among the reserve forces. So the concept of reserve forces should include all human and material resources mobilized for national security and mobilizationoriented units augmented in wartime.

[Keywords] Reserve Forces, Total Force, Mobilization, Reserve Unit, ROK Army's Mobilization Force Command

# **1. Introduction**

Korea is a divided country and at the same time a country in a ceasefire. The Korean Peninsula is like a gunpowder warehouse in Northeast Asia where tensions and anger accumulated over a long period of military confrontation and contraposition between the two Koreas can turn into conflict or war at any time. In addition, this region is also a place where strategic competition between the US and China, which has intensified since the spread of COVID-19, and conflicts with neighboring countries are in sharp. National Defense is required to actively respond to transnational and non-traditional threats in addition to traditional security threats [1].

However, domestic defense conditions are poor. First of all, the shortage of military service resources is serious due to the rapid decline of the population, which is approaching reality.

Due to the impact of the corona pandemic, it is difficult to provide sufficient financial support for the defense sector. The development of science and technology in the 4th industry is expected to rapidly change the battlefield of the future, so it is necessary to hasten the task of changing the constitution of the military to adapt to it[2]. It seems clear that the government and the military have considerable difficulties in establishing defense policies that respond to the environmental changes and demands of the times.

However, building a strong national defense is still the responsibility of the state and the reason for the existence of the military[3]. Now, policy measures to realistically respond to various future national security threats must be found in the reserve force. The pursuit of priming reserve forces into the elite in both the past Defense Reform 2020 and the present Defense Reform 2.0 may have come from this recognition[4]. However, it is disappointing that the reserve force has been revealed as a result of the recent state audit. This is because, despite the fact that it was pursued as a key task for national defense reform, problems with the reserve force's weapon systems and equipment appeared to be serious. The reserve force budget also said to be expanded to 1% of the national defense budget, but in 2022, it was only 0.47%, which was less than half.

This fact raises doubts as to why policy on the reserve forces promoted in the defense reform of the Roh Moo-hyun administration did not come to fruition for nearly 20 years, and whether the reserve force, which has not changed much from 50 years ago, will be able to sufficiently cover future national security[5]. In recognition of this problem, in order to conduct a prescription-oriented study to strengthen the reserve force to the same level as the standing army, it is necessary to first diagnose and analyze the entire reserve force. A comparative analysis of the ROK military reserve forces with the US total force approach from. Through this, problems with the reserve force as the total force of the Korean national defense would be derived. Based on these results, policy recommendations will be made for the development for reserve forces. of ROK.

# 2. Total Force Policy of U.S.

#### 2.1. Change in the concept of reserve power in the process of policy formation

In 1969, the Nixon administration pursued strategic changes to restore the US defense force sunk in the Vietnam War and balance power with emerging actors in response to the Soviet threat. From 1970 to 1973, the United States abolished the conscription system and switched to the volunteer service system. To this end, the US foreign policy and national security strategy were revised, followed by changes in military strategy and defense plan [6].

According to the realistic deterrence strategy, Melvin R. Laird, the first Minister of DoD of the new administration, named the military force with strategic sufficiency as 'Total Force'. In 1971, he proposed the Total Force Concept, in which the reserve forces follow-up the standing forces in case of emergency. Instead of reducing the standing army to an appropriate level in peace-time, he wanted to nurture a reserve force to reinforce the necessary power in case of emergency. This concept could be achieved through the Force Planning Initiative, the development of advanced technologies, and the formation of a combined force with allies. This force plan included a plan to foster reserve forces and support the standing forces [7].

However, based on the results of re-evaluation of the Soviet Union's conventional power in Europe, various research institutes have come up with an analysis that the power required to suppress them is insufficient by about 3 divisions. This could not be ignored by the DoD and Army. However, for the United States to have an additional standing force, the political and economic losses the Nixon administration had to bear were great. At this time, a plan was proposed to replace the additional required power with the reserve force without the reinstatement of the conscription system[8].

In 1973, the Army Chief of Staff, Creighton W. Abrams Jr., reported to the Minister of DoD, James R. Schlesinger, a plan to expand conventional forces using reserve forces in case of emergency. The Defense Minister drafted this proposal under the title of 'Total Force Policy'. This policy plan was to expand the conventional force that was lacking in case of emergency through a mixed formation of the standing and reserve forces. As a result, four brigades belonging to the National Guard were included in the wartime formation of the army's four standing divisions, and the army could expand to 16 divisions[9].

Although this policy has its origins in Laird's concept of total force, it is meaningful in that the perception and character of the reserve force has changed from the auxiliary force of the standing army to the companion force. This policy transformed the U.S. reserve force into an operational force that was mobilized early in the war and performed equivalent missions with the standing forces. In other words, the reserve force came to mean a unit capable of demonstrating the same level of combat power as the standing force while being mobilized. For this, the modernization of the reserve forces and changes in the training system were inevitable.

#### 2.2. Promotion of modernization of reserve forces in the MND and army of US

The Army's traditional perception of reserve forces was mistrust. During World War II and the Korean War, the reserve forces became bloated. At that time, the reserve force was a dull organization that took at least one year to complete its mission even if it was mobilized[10]. The readiness posture of the reserve forces mobilized during the Berlin crisis of 1961 was the worst[11]. For this reason, the United States was hesitant to send reserve forces to the Vietnam War[12]. The aspect of modern warfare has changed and the battlefield environment has changed, but the reserve forces remained in the past.

The Ministry of National Defense attempted to reform this outdated reserve force. First, the structure, organization, and training fields of the reserve forces were reformed. In 1967, Defense Secretary, Robert Strange McNamara, promoted the creation of the Selected Reserve Force. The DoD selected 150,000 of the army reserve forces and formed a Rapid Response Force. The Ministry of National Defense selected 150,000 of the army reserve forces and formed a rapid response force. This reform was successful, and the unit participated in the Vietnam War in 1968 and was well received by field commanders. After that, the National Guard was organized mainly as a combat unit, and the Army Reserve Force was reorganized into combat support and combat service support units. These reforms of the DoD contributed a lot to dispel the army's distrust of the reserve forces.

In order to shorten the preparation period for mission performance, the Army has ordered that they complete mastery of essential combat tasks prior to the mobilization order. Accordingly, from 1969, each unit conducted tactical training and evaluation from platoon to company. In 1970, the reserve force was strengthened by applying the standing army training system to the reserve forces and conducting the standing army-reserve army integrated training(Army Affiliation Program). In the integrated training of the standing army and the reserve army, one battalion of the reserve battalions were to undergo joint training with the standing army battalions operating with them once a year in case of emergency. This had the effect of increasing the combat readiness and interoperability of the reserve forces. Since 1973, this training has been further strengthened, and all reserve forces have undergone three-week integrated training.

In the same year, this system was developed and the 'Round-Out Brigade Concept' was introduced. This concept refers to a brigade in which the units required to fully form a standing division in wartime consist of a reserve force. When the mobilization order is declared, this brigade will be organized into a pre-planned standing division and carry out its mission. In 1974, four brigades of the reserve army were trained together with the standing division to be organized in wartime. Following the abolition of the conscription system, the reserve army, like the standing army, was in short supply. Therefore, many difficulties arose in the formation of the troops. To solve this problem, various incentives were provided, such as a wage increase for the reserve army. In addition to recruiting the standing army, the Army also studied the method of recruiting troops for the reserve forces. And under the concept of "One Army", the reserve forces were included in the standing army formation.

Meanwhile, reforms were also promoted in the field of weapons systems and equipment and materials for the reserve forces. Even before that, there were voices in various studies that the reserve forces should be modernized for modern warfare. These discussions were gradually discoursed as the Standing Army-Reserve Force Mix. In the 1970s, the modernization of reserve forces was promoted as part of the modernization of the US military force. From 1971, equipment and materials used in the Vietnam War were transferred to the reserve forces. In addition, the equipment of the reduced standing army was taken over by the reserve force and used. However, at that time, the United States was engaged in the Vietnam War, so it was not enough to secure supplies, equipment, and budget for the reserve forces. The shortage of supplies was a major obstacle to the modernization of the reserve forces [13].

# 3. Establishment and Development of a New Concept for Mobilization Division in the ROK

#### 3.1. Current concept and limitations of reserve forces in national defense

The ROK advocates the theory of companion power in terms of the reserve, but in reality, it is evaluated that it remains in the perception and policy close to the theory of auxiliary power[14]. This is because the composition of the reserve forces is limited to personnel, material resources, and each capability. Policies also exist in the mobilization plan as matters related to the organization, and combat power of units composed of these resources. <Table 1> shows a comparison of the reserve forces of the US and ROK.

Division		Reserve	e of U.S.	Reserve of ROK			
Identity		Military	Civilian				
	Ready reserve		Standby	Potirod	Mobilization	Mahilipatian	
Categories	Selected reserve	Individual ready reserve	reserve	reserve	designated	non-designated	
Organization	Designated unit		Unorganized		Designated unit	Community or workplace reserve forces	
Drill	14~39 days		at least 1 day		2 nights 3 days		
Sizes	~810,000		~250,000	~200,000	~3,00	0,000	
Budget		9% of defer	ise spending		1.2% of defense spending		

Table 1. Comparison of reserve forces of the US and ROK.

Note: Shin D & Jeong CW. Suggestions for elite Korean reserve forces through U.S. reserve forces development cases(2016).

This is problematic because it is based on perceptions that have only been possible in the past. At that time, there were abundant resources and enough time to prepare for battle. This trend of recognition has focused on maintaining the status quo and quantitative management in terms of scale and composition of the reserve[15]. In other words, it was gradually hardened into a bureaucratic work behavior that only paid attention to the annual adjustment of the organization for training or change of formation[16].

When the mobilization order is declared, the mobilization division must expand its units within a few hours and deploy to the operational area within 24 hours to carry out its mission[17]. In the peacetime, mobilization division operates 8% active duty, 0.1% military personnel, and 4% individual ready reserve(IRR) compared to the wartime[18]. With this troop

structure, they should be fully formed as a reserve force in wartime and assigned to the corps to perform the same duties and functions as the standing division. It is important for mobilization-oriented units to secure excellent mobilization resources in order to display their combat power immediately in the early stages of war. To this end, the Military Manpower Administration has issued a mobilization designation and management policy and is trying to increase the utilization of available resources by applying various methods and priorities. However, since 45% of designated mobilization are replaced every year or the unit's fixed resources are less than 60%, the military service administrative system is rather complicated.

Mobilization training needs to be systematically completed from individual training to unit tactical training in accordance with the mission of the mobilization division, but 2 nights and 3 days are insufficient schedules to master the essential training tasks. As a result, mobilization training has no choice but to focus on mastery of major skills[19]. In addition, reservists who do not participate in mobilization training must complete 32 hours of training tasks that are not related to wartime missions[20]. Ssangyong Training, the division's comprehensive training, is a training that verifies the corps-centered mobilization operation plan. However, only one-third of the division is participating in this exercise. Due to the lack of troops and equipment, they have to receive support from the adjacent mobilization divisions, and the training period is short, so they are preparing for the training in advance.

Categories Unit types	Cannons*	Tanks*	Communications	Equipment	Materials
Mobilization division	100%	100%	42%	59%	89%
Mobilization supplement battalion	41%	25%	8%	26%	45%

 Table 2. Level of equipment and materials for reserve forces for mobilization-oriented units.

Note: Cannons(towed: 105 mm, M114, KH-1790), Tanks(M series: M48A 3K, M48A 5K).

Most of the weapons, equipment, and materials of the mobilization division and the mobilization supplement battalion have passed 30 to 40 years after they were produced. Although their dependence on mobilization is 93%, their equipment and material possession rate is low at an average of 65% as shown in Table 2. Major equipment such as tanks and cannons are being conducted in a reduced scale, so it is impossible to say that this is a practical exercise that assumes a wartime situation. Training on the main skills of mobilization training also takes a lot of time to develop skills if it does not match the skills of the reserve forces[21]. According to the 2019 analysis of the Mobilization Force Command, the results prove that the time required for mastery of the mission is five times that of those with the right Military Occupational Specialty(MOS). In mobilization-oriented units, 82% are appropriate MOSs for the position means that even if the units are deployed quickly, it will be difficult to fully demonstrate their combat power[22]. The formation and training system of the mobilization support groups provided to the corps by establishing a mobilization supplementary battalion during wartime is also similar to or lower than that of the mobilization division, so its combat power is likely to be low.

# 3.2. Reserve forces capable to 'force-mix' with the active forces

Unlike the United States, the South Korea is directly confronting an enemy with a large military force. The country is small, so the depth of the battlefield is short and the front is narrow. Most of the human and material resources are concentrated in the metropolitan area. With the development of weapon systems and the operation of enemy special warfare units, it would be meaningless to respond by dividing the battlefield into front and rear in case of emergency [23]. Considering these topographical conditions, resource distribution, and enemy threats, the missions and roles between the ROK military's standing and reserve forces must be reestablished. Accordingly, adjustment of the unit structure, organization, and resource allocation will have to be made.

It is necessary to distinguish the wartime and peacetime missions and roles of the two forces in terms of the total force. Standing forces should focus on war deterrence and initial response in peacetime, and operate with mobilization-oriented units in wartime. The reserve forces respond to national disasters and terrorism in peacetime, but in wartime, the regional reserve perform rear-area operations together with the regional defense division, and the mobilization reserve perform stabilization and civil affairs operations[24]. According to this concept of operation, it is reasonable to plan and operate the divisions deployed within the corps operational responsibility area in various ways, such as 100% standing army, mixed standing army-reserve army, etc. considering the missions according to the front and rear.

In other words, the front division will completely organize its troops, equipment, and supplies at 100-110% of the wartime requirement, and the mobilization requirement will be 0%. It is to apply the concept of fighting during wartime and peacetime as it is with the existing power to the organization. In this way, the administrative burden of mobilization of the forward division will be completely relieved. Corps and divisions will also eliminate the need to transport and guard mobilized forces. The forward division is to ensure the conditions in which it can focus only on the vigilance and the initial battle. The rear standing division develops a plan to operate by exchanging and combining the forces of the mobilization division's brigades and battalions. The active division will have no choice but to operate together with the mobilization division's power for wartime due to economical military force operation in peacetime [25]. Therefore, the mobilization division that is attached to and reinforced by the corps must have the capability and combat power to operate together with the standing division. This means that the mobilization division must be prepared from peacetime so that it can display the same combat power by combining forces with the standing division immediately after mobilization.

Therefore, the concept of reserve force must also be re-established in accordance with the changing circumstances of the times in Korea. In case of a reduction in military service resources and changes in the unit structure, it is unavoidable to combine operation of a standing force and a reserve force in case of emergency[26]. The reserve force must be able to immediately demonstrate the same level of capability as the standing force. Therefore, the components of the reserve force need to be expanded to include the units and their combat power in addition to human and material resources.

In order to ensure that the mobilization-oriented units can display the combat power of the standing division immediately upon mobilization, their capabilities must be increased according to the following principles. First, the standing army should be modernized to focus on combat, while the mobilization-oriented units should be modernized and armed in the direction of being exclusively responsible for combat support and operational sustainment.

Second, it is necessary to prepare a system and conditions in which standing and reserve forces can exert the same combat power and mix them with each other. This is an attempt to expand and apply the concept of the Round-out brigade in the United States in the 1970s to battalions and companies. Currently, the U.S. military has been piloting a similar program for combat brigade teams and some military units since 2016 under the name of the "Associated Units Pilot Program." It is possible to consider a plan to include the formation of subordinate units of the mobilization division to be integrated during wartime in the standing division's organization table.

Meanwhile, one brigade in the future will have the ability to control five combat battalions[27]. The mobilization division should also develop into a brigade-centered modular unit structure like the standing division. Then, each company or battalion under the subordinate of the standing and mobilizing divisions can be composed of mixing from 1:4 to 4:1. This can be done in various ways in consideration of the mission for each operation stage, the deployment and integration period of each unit[28]. Third, it is necessary to clearly establish responsibility and authority for command relations, readiness, training, etc. between standing forces and reserve forces that integrate power. To this end, the higher in the mixed unit must reflect the formation of the integrated unit in its own organization table and specify the command relationship. Then, it will be possible for commander and his/her staffs to command and supervise for the preparation of the integrated unit's combat readiness with the legitimacy and authority. In addition, it is possible to review the operation of the 'Force Integration Support Team' in the corps and division staff departments from peacetime. This support team supports the integration of combat brigades and battalions into divisions and brigades in wartime, and in peacetime has the task of inspecting combat readiness posture, instructing training and supervising the united units on their behalf. This team is composed of a reservist like IRR, but it is necessary to work part-time throughout the year or for a certain period in consideration of the unit's mission.

Fourth, the training system of the mobilization division should apply the training management system of the standing division to create wartime response combat power and balance the power with the standing army. The expansion of the personnel, the modernization of equipment and materials of the mobilization division do not mean that it has the same combat power as the standing army. The mobilization division must have the same combat power as the standing division to become a useful entity for corps operations. In order to improve the military effectiveness of the reserve forces, training is of paramount importance. This is because the mobilization division, which lacks military effectiveness, cannot carry out operations coordinated with the standing division, but rather puts a burden on it. Therefore, the mobilization division must complete the tactical tasks of the company and battalion during peacetime, that is, before it is mobilized. For this, the training period needs to be extended to 2-3 weeks. In addition, each company or battalion under the standing division and the mobilization division should be combined to suit their missions to activate regular integrated training [29].

Fifth, it is necessary to stably manage the resource organization of the mobilization division by expanding the recruitment of part-time reserve forces to the enlisted. In order to establish the above-mentioned division of duties and functions, structure and organization, allocation of resources, and education and training systems for the standing and reserve forces, the mobilization reserve forces must be regularly organized and trained in the mobilization division. The military selects reservists for regular service, but the contract condition is for 5 years or more, 120 to 180 days per year, or full-time service. And by giving them the same wage system and welfare benefits as the standing army, the mobilization division reserve force is maintained as fixed as possible[30]. To this end, it is necessary for the Mobilization Force Command to directly take responsibility and authority to operate all mobilization-oriented units, including resource designation and management, convening and training.

## 4. Conclusion and Policy Recommendations

The ROK must complete the reduction of its troops by about 360,000 by 2022. Assuming that the number of divisions reduced by the national defense reform is the amount of power needed at the beginning of the war, the alternative would be mobilization-oriented units such as mobilization divisions and mobilization supplementary battalions. However, their strength and readiness have not improved significantly compared to the past in terms of structure and organization, training system, and budget[31]. This is the result of not breaking away from the past perception that the reserve force is still an auxiliary force of the standing army and complacent with the conventional construction and maintenance of military force. In other words, there is a problem in the perception of the concept of reserve force as a state in which one resource, such as personnel and materials, is combined through mobilization. In the past, there was sufficient time to mobilize personnel and to produce and train weapons, equipment, and supplies for them. These assumptions, which were only possible in the past, are being made now. The changed security environment, war patterns, and geographical conditions of Korea must have a reserve power to fight immediately after mobilization. The concept of a reserve forces should be extended from a combination of mobilized personnel and materials to a unit composed of them. First of all, efforts should be focused on improving the operational capability and effectiveness of the mobilization-oriented units among the reserve forces[32]. The reserve force should include all human and material resources mobilized for national mobilization, as well as mobilization-oriented units that are expanded during wartime.

In addition, selection and concentration should be made for the modernization and armed of the reserve forces in terms of total force. The formation of the front division should be completely organized from peacetime so that there is no mobilization required, and the rear division should be able to perform operations by combining forces with the mobilization division. Mobilization-oriented units should be in charge of missions other than combat, and the Mobilization Forces Command should be responsible for nurturing and managing their forces. Therefore, the priority of armed should be placed on the mobilization division. In addition, the IRR, parttime reserve, should be expanded to the enlisted to secure the stability of resource operation necessary for unit structure and organization, education and training system, and maintenance of combat power. As priority is given to the reinforcement of forces for the mobilization division, the reserve forces must be modernized and armed at the same time as the standing forces in the defense acquisition management system. In order to secure the budget rationally, it is necessary to present visible and specific goals for each task of upgrading the reserve force to elite and modernization, independence of the budget acquisition system, and reflection of the budget focusing on the cost of improving defense capabilities.

Now is the time to quickly redefine the new concept and scope of total and reserve forces suitable for the ROK military. This is because, based on this, policies and institutional development directions for the innovation of reserve forces that will contribute to future security can be prepared quickly and wisely. It is suggested that concentrating the capabilities of military policy to first develop the forces of the mobilization division together with the standing army is a realistic and wise choice for building a strong national defense.

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# 6. Appendix

# 6.1. Authors contribution

	Initial name	Contribution
		-Set of concepts 🔽
		-Design 🔽
		-Getting results 🔽
		-Analysis 🗹
		-Make a significant contribution to collection $ igside S$
Author		-Final approval of the paper 🛛
Additor	IJ	-Corresponding 🔽
		-Play a decisive role in modification $\ igside{ u}$
		-Significant contributions to concepts, designs,
		practices, analysis and interpretation of data $\ igside u$
		-Participants in Drafting and Revising Papers 🔽
		-Someone who can explain all aspects of the paper $igsirgup$

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# The Influencing Factors on SUDAN'S DISPUTE Settlement and Its transition to the Democratic System

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#### Abstract

**Purpose:** In the case of a conflict that today destabilizes a country's system such as a complex civil war, it is quite difficult to resolve it on its own. If disputes are not any more internal problems and threaten international security, efforts by the international community cannot help but be made. The purpose of this study is to analyze how the resolution of disputes in a country and the transition of democratic systems can be achieved through multilateral cooperation among various actors in the international community.

**Method:** To this end, the situation of Darfur in Sudan will be selected as a case study. First, the factors that influenced the resolution of conflict faced by Sudan and the transition of the democratic system will be divided into internal and external factors, then I look at how these factors worked and what the correlation between them is.

**Results:** The two internal factors, the demand for democracy by civil society, which used the coup as an opportunity for change, and the resolution of disputes by the transitional government and the transition to a democratic system, had positive impacts on Sudan. The external factor pushed by the U.S. has affected the will of the interim government for the transition to the democratic system. Efforts by the international community, including the United Nations, served as a positive external factor, too. The creation of a peace-building mission in response to the Sudanese government's willingness to resolve the problem has served as a practical external factor of the international community.

**Conclusion:** Intra-state conflict is not easy to be settled by the country's single will. Therefore the Sudan case has meaningful implications to us on how that state and the international community will have to seek more inclusive efforts.

[Keywords] Multilateral Cooperation, Sudan Transitional Military Council(TMC), African Union-UN Hybrid Operations in Darfur(UNAMID), UN Integrated Transitional Mission in Sudan(UNITAMS), Peacekeeping Operations(PKO)

# **1. Introduction**

The internal and international border are not always clear and sharp. The internal conflicts of each state are currently based on problems such as: civil wars, counterinsurgency and counterinsurgency, and war against drug trafficking. In these cases, there are third parties that support those states with means. But they avoid the deployment of troops on the ground, affecting the borders of states making these conflicts regional in many cases[1][2][3]. The participation of third parties, but avoiding the deployment of troops on the ground has been one of the continuous forms of conflicts of high and medium intensity that have marked the beginning of the 21st century[4].

The nature of conflicts in the 21st century will continue to maintain the relationship established by Karl von Clausewitz in his book "On War", as a political instrument and mainly the relationship of the trinity, with the passion of the population, the rationality of politicians and the will of the military[3][5]. Disputes in the 21st century act as described above, measures to resolve them have also developed in response to these trends.

Darfur is a typical north-east African civil war, consisting of multiple overlapping conflicts interspersed with large-scale offensives by the government army and its proxies and rebels[6]. The conflict in Darfur of Sudan, known internationally as the "Sudanese Civil War," has marked a new turning point with multilateral cooperation from the international community. The actors who led the conflict resolution were the United Nations and the African Union(African Union, AU) based in Africa. The two organizations began a unique form of peace keeping activity jointly established by them to resolve the civil war in Sudan and withdrew after achieving the mandate authorized by the UN Security Council. Since then, the authority of peacekeeping has been handed over to peace-building, the activity that strengthens the vulnerable national operating system to prevent the recurrence of disputes.

International attention caused by the Darfur conflict increased again at the end of the dispute resolution when President al-Bashir, who took power in a 1989 coup, was disqualified in a military coup. I would like to find out the impact factors that were able to resolve the conflict in Darfur in the face of multi-faceted threats even before national governance was normalized and to find out what this means.

To this end, the factors that affected the settlement of disputes and the transition to the democratic system are largely divided into two factors: internal and external factors. Each influencing factor is believed to have had a positive as well as a negative impact on solving the problem that Sudan is facing. Even though there are unstable factors that hinder progress in a developmental direction by having a negative impact on dispute resolution and the transition to the democratic system, the international community estimates that Sudan is achieving desirable results. I would like to find out why the Sudanese issue is considered a desirable outcome at a time when there has been a coup due to its weak national base and the Darfur conflict has been ending now.

# 2. Civil war in Darfur in Sudan and the Military Coup

# 2.1. The matter of Darfur in Sudan

Figure 1. Geographical locations of Darfur and Sudan.


The Darfur civil war in Sudan is entangled by complex factors, finding no agreement between the Khartoum government, a number of resistant armed groups, or the parties involved in the conflict[6]. On July 31, 2007, after regional efforts, the UN Security Council Resolution 1769 established this hybrid peacekeeping presence, the African Union/United Nations Hybrid operation in Darfur(UNAMID)[7][8][9]. The mission aims to support the creation of a stable and safe environment in Darfur, to monitor and identify violations of the cease-fire, to protect civilians and to implement peace agreements in Darfur and subsequent agreements. The prioritized goal of the U.N. police component of UNAMID was to create the capabilities of the Sudanese police structure and seek measures to protect civilians, such as the IDP, by engaging in Sudan's central and local government activities[10].

As the situation improved due to a joint peacekeeping operation by the UN and the African Union, the peacekeeping operation adjusted the priorities of its mission in 2017 and began the transition for withdrawal, including the reduction of military and police personnel for two years. During this period, cooperation with the United Nations Country Teams(CT) was essential to maintain sustainable peace in Darfur[11].

The two-stage plan to downsize a peace-keeping operation was approved to carry out peacekeeping in specific areas where armed forces are active and to carry out peace-building in the rest of Darfur. The UNAMID ended its activities on December 31, 2020, and the United Nations established the UN Integrated Transitional Mission in Sudan(UNITAMS) to support the transition to Sudanese democracy through politics, peacebuilding, and development plans[12].

#### 2.2. Emergence of the military coup

Amid the ongoing peacekeeping operation in Darfur, massive protests against the Al-Bashir government, which had been in power in Sudan for nearly 30 years, lasted for months, followed by a military coup in April 2019, and al-Bashir was ousted[13]. After the coup, the Transitional Military Committee(Transitional Military Council, TMC) was formed, but its members consist of figures during the Al-Bashir regime. Contrary to expectations, however, the military immediately indicted the former president to hide military brutality and subsequent corruption in the past Darfur civil war, and to weaken public resistance to the military. The Sudanese Defense Minister announced that the military would hold elections after a one-year transitional state administration. The military tried to stop massive protests led by the "Sudanese Professional Union(SPA)" by imposing a three-month emergency and a nighttime curfew, but civilian protesters continued their protests, demanding an immediate transfer of power to the civil sector.

In the midst of this, the unstable situation continued in the military, as the chairman of the Joint Chiefs of Staff was dissatisfied with the core power and power hierarchy in the military, as well as the Sudan Transitional Military Commission(TMC), and attempted a coup to restore former President Al Bashir, who was ousted[14].

# 3. Influencing Factors of Dispute Settlement and Transition of Democratic System

### 3.1. Internal factors

Social movements represent a looser mass-based association of individuals and groups dedicated to changing the status quo. Social movements vary enormously in the types of formal or informal structures they use to mobilize support from activist networks to national and transnational social actions[15]. In this regard, Social movements in Sudan consolidate civil society and create a political actors to negotiate with the government.

First, the 2019 military coup, which toppled the Al-Bashir regime, has had the biggest impact on the Sudan issues, which has been running smoothly as previously described. It was an unexpected obstacle for the United Nations, the African Union, and related countries affected by the civil war in Sudan, which planned a smooth withdrawal of the peacekeeping operation. In response to the demand for transfer to civil affairs by citizens who were concerned about the long-term rule of the military government, the Sudanese Transitional Military Council mobilized Rapid Support Force(RSF), a former Janjaweed militia that supported the civil war in Darfur, to suppress protesters, causing bloodshed. Therefore, there was no clue to the dialogue between the military and civil forces.

In the early stages of negotiations between the military and civic political forces, Arab countries, including Saudi Arabia and the United Arab Emirates, were reportedly supporting the military and pressuring the West to establish a civilian-led administration, not only making it difficult to reach a peaceful agreement between the military and civilian protesters but also raising concerns over the involvement of interested countries to further complicate the situation. In July 2019, the Sudanese Transitional Military Council agreed on a three-year sharing power with the Forces for Freedom and Change(FFC), an alliance of civic political forces. The military insisted on military-led state administration, causing raising suspicions about the regime's willingness to make efforts to transfer to civil groups. Regarding issues related to the authority to manage state affairs, Sudan has opened a new way to switch to the operation of state affairs by a civilian government by signing the "Constitutional Declaration" document in August 2019. The 'constitutional declaration', which features a transitional government that will lead Sudan at the turn of three years until the election, contains the following [16].

\*The Sovereign Council is comprised of a total of 11 people, including five soldiers appointed by the Transitional Military Council, five civilians appointed by the Force for Freedom and Change, and civilians appointed by mutual consent

\*The Sovereign Council oversees the creation of the council of Ministers and the Legislative Council. 67% of the legislative council appointed by the Forces for Freedom and Change

\*The Prime Minister appoints 20 ministers from the list of nominated candidates proposed by the forces for Freedom and Change, excluding the Home Office and the Defense Ministers, and forms a Cabinet

\*Over the next six months, discussing with various armed forces in Sudan to develop new policies and achieve comprehensive and lasting peace

\*And protection of equal social, civil, political, cultural and economic rights of men and women in relation to human rights and freedoms of Sudanese

The structure of decision-making in most organizations is very uniform and masculine, and it is urgent to ensure that women are fully involved in each sector of society and gender values are balanced[17]. The constitutional declaration implicates meaningful attempts of not only integration of military and civil forces, but also integrating of gender mainstreaming.

The fact that the Military General leads the Sovereign Council first, but the "Forces for Freedom and Change" can affect the formation of a cabinet with a large proportion of civilians and that the authority is not biased toward the military indicates that the Transitional Military Council is willing to transfer to the civilian government for national development.

It said it will continue to develop policies in consultation with armed forces in Sudan, showing sufficient willingness to resolve disputes as well as potential disputes through efforts to attract them into the system. The transitional government also followed policies for women pursued by the United Nations and participated in a necessary role as a member of the international community by allocating at least 40% of the seats to women in the Legislative Council and giving two seats for women in the Sovereign Council in order to expand of women's political participation.

Such as this public policy processes grow more complex with the increased involvement of business, not-for-profits, interest groups, and multiple levels and units of government. Furthermore, this complexity becomes more intense as policy actors create ties with each other and as they pursue their

goals[18]. The Sudanese Sovereign Council, launched after the lifting of the Transitional Military Council, focused on solving chronic economic problems by appointing Abdullah Hamdok as the prime minister who has extensive experience in international organizations. Friendly relations with the UN-Sudan had to lift economic sanctions off the U.S. list of terrorist-backed countries and also needed support from the international community, including the UN which supports the lifting[19]. As Brown argues, African states are increasingly separated by aid donors into categories like good performers, bad performers, fragile states, and failing states. Integrating the international and Sudanese economies by improving relations with the U.S. was the best way to overcome the crisis facing Sudan. Therefore, Sudan showed its efforts to implement large-scale reforms based on what was stated in the "Constitutional Declaration," and included an internal and external promise to internal and external promises to form a civilian cabinet by the prime minister and to hold democratic elections after the transition. The interim government has resumed peace negotiations with anti-government militants since the days of Al-Bashir and has prioritized ending the armed conflict.

The prime minister declared a permanent ceasefire not only in Darfur but also in the disputed areas, South Kordofan and Blue Nile within six months. He also temporarily asked the United Nations to stop reducing the number of UNAMID peacekeepers in the Darfur region. The UN Security Council was in the process of reducing the number of UNAMID as part of the preparation for its withdrawal in 2020 but decided to extend its mandate in consideration of the political crisis and not to cut personnel until the end of March 2020, giving a boost to Sudan's transitional government.

The second influencing factor is the Sudanese transitional government's willingness to resolve disputes and switch to a democratic system. At the time of the UNAMID's transition to the initial peace-building phase, Sudan recognized the need for a new mission to support the implementation of the peace treaty during the three-year preparation period for the transfer of the civilian government and asked the UN to create a mission after the end of the AU-UN's peacekeeping mission. The UN DPPA(Department of Political and Peace-building Affairs) aims to develop the capabilities of Sudan's state agencies in charge of sustainable development during the transition period for the regime's civilian transfer by deploying the Special Political M ission(SPM) to Sudan. The plan was to support the successful transfer of authority to the democratic government under the responsibility of the Sudanese government, limiting the deployment of the special political mission to the transition period of the interim government.

The Special Political Mission in Sudan(the UN Integrated Transitional Mission in Sudan(UNITAMS) began its mission on January 1, 2021[20].

The coup d'état in Sudan itself had a negative impact and bloody clashes with protesters against the former government were expected. The clash between Rapid Support Force(RSF) and protesters, known to have ties with al-Bashir, led to the first bloodshed since the coup in April 2020. However, "The constitutional declaration" between the "Forces for Freedom and Change" and the Transitional Military Council officially reached the agreement, both sides focused on minimizing military intervention and civic-led transitional government. I believe it was possible to take a series of measures to clean up the existing regime and lift U.S. economic sanctions because of the interim government's will and efforts to restore the Sudanese national system. The number of members of the Sovereign Council expanded from the first 11 to 14 in February 2021, and the additional members were anti-government organization leaders who additionally signed the peace treaty, bringing more armed groups into the system to maintain the effectiveness of the peace treaty.

#### 3.2. External factors

One of the external factors to influence a country is sanctions. When negotiations founder among direct parties, sanctions are intended to encourage or compel the coup leaders to negotiate with the Secretary-General of the United Nations. The State Department in the United States defines "terrorism as a carefully prepared political violence in which non-combatants are targeted to influence a large number of people, either quasi-state organizations or national secret agents," and the FBI has divided terrorism into international and domestic terrorism[21][22].

The first external factor that affected Sudan's transition to a democratic regime is that Sudan is included in the list of countries supporting terrorism designated by the U.S. and economic sanctions are valid. According to the U.S., Sudan has been considered as a country to support international terrorism since the former government. In early 1996 the U.S. withdrew its ambassador from Khartoum and imposed trade sanctions[10].

Table 1. U.S.	sanctions	imposed	and lifted	to	Sudan	[23][2	24]	
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Years	Contents
Designated as a terrorist-supporting country in 1993	<ul> <li>-Excluded from the financial market</li> <li>-No necessary debt relief and funding from international organizations</li> <li>-Restrictions from foreign capital investments</li> </ul>
Lifting the trade ban in 2017	-The trade ban has been for 24 years. During that period, foreign capital investments were impossible
December 14, 2020	-Sanctions against Sudan were lifted from the designation of terrorist-sponsoring countries imposed by the U.S.

The trigger for the massive anti-government protests that followed the ouster of former President al-Bashir was Sudan's chronic financial crisis, but the U.S. economic sanctions, which lasted more than 25 years, also played a role in that situation.

By 1997, the U.S. was not only attempting to isolate Sudan but also indirectly arming "The Sudanese People" (SPLA) fighters. And anti-government organizations to overthrow the Khartoum government and has imposed international sanctions, judging that Sudan is a sponsor of international terrorism and a gathering area comparable to Iran [25]. In other words, due to the U.S. sanctions, Sudan could not receive funding from the International Monetary Fund (IMF) and the World Bank. U.S. aid, defense exports were banned and foreign capital investments have also been restricted. Sudan's transitional government not only passed a law of disbanding the former ruling party and reverting its property to the state but also showed its willingness to clean up the past regime by implementing measures such as banning politicians belonging to the Bashir regime or political parties from engaging in political activities for the next decade.

A key prerequisite for the U.S. excluding Sudan from the list of terrorist-sponsoring countries is the signing of a peace treaty between governments and anti-government organizations. After the Doha Document for Peace in Darfur(DDPD), the transitional government held peace talks with Darfur anti-government organizations in December 2019 and signed a preliminary peace agreement with the Sudan People's Liberation Movement-North(SPLM-N) among major anti-government forces in January the following year to lay the groundwork for the final agreement.

The U.S. resumed ambassador-level diplomatic relations with Sudan by positively evaluating a series of measures attempted by the Sudan transitional governments, and the sanctions, which were expected to take time, were eventually lifted after the U.S. removed Sudan from its terrorist aid list about 11 months after the resumption of diplomatic relations. UN Secretary-General Antonio Guterres welcomed the Sudanese government's efforts to stop supporting terrorism and asked the international community to provide financial support for Sudan.

The second external factor is the efforts of the international community, including the United Nations, to solve the problems facing Sudanese people. As conflicts continue to engulf the African continent, the international community has been drawn into the crisis in one way or another [26]. After the 2019 coup, the "Constitutional Declaration" was quickly announced in

Sudan because the mediation of global, regional, and sub-regional organizations such as the United Nations, the African Union, the Inter-Governmental Authority On Development(IGAD), and Ethiopia played a major role in allowing the military and civic forces to reach the agreement on that. In fact, IGAD has been engaged since 2003 in efforts to develop a new peace and security strategy[27]. Due to a coup d'état in 2019, the peace process related to the civil war in Darfur was suspended as the existing negotiating body disappeared after the Al-Bashir regime fell. Therefore, the launch of the Sudanese Transitional Government, which consists of the Sovereign Council, meant the emergence of a new negotiating body with the existing armed forces. In other words, there was no reason for anti-government groups to reject the interim government that was hostile to the Al-Bashir regime, prosecuting Al-Bashir and clearing the existing regime. It increased the likelihood of peacefully resolving disputes not only in Darfur but also in South Kordofan and Blue Nile, so the result of an agreement among parties concerned in Sudan presented how much the role of mediators from global and regional levels was paramount.

The United Nations, which was preparing for the transition from African Union-UN Hybrid Operations in Darfur(UNAMID) to peacebuilding activities, recognized political environmental changes such as the launch of an interim-government as a special opportunity to end permanent conflict and achieve overall peace throughout Sudan. For this reason, the United Nations focused on creating an environment in which more armed groups could participate in the transfer process pursuing the civil government to comprehensively implement the Doha Document for Peace in Darfur(DDPD). The DDPD is the culmination of two and half years of negotiations, dialogue, and consultations with the major parties to the Darfur conflict, all relevant stakeholders, and international partners. Also in accordance with the DDPD, the Government of Sudan appointed a Darfur Regional Authority and a Darfuri as Second Vice President of the Republic of Sudan[28]. The changes that took place in Sudan provided conditions to dismantle the existing long-term government and advance to a democratic regime, so the United Nations, the African Union and, the IGAD did not miss the opportunity and actively sought to reach an agreement through bilateral negotiations between the Sudanese military and civil political forces. Its success in mediation between the Sudanese Transitional Military Council and civil political forces, the interim government, and armed groups has enabled the UN to solidify further its political position as a multilateral security cooperation body in the world, leading the African Union of a regional organization and IGAD of a sub-regional organization in charge of East Africa. In particular, the IGAD, which had a weak position as a sub-regional organization, clearly imprinted its presence as an East African security organization by actively intervening in both national issues, by organizing its committees to devise proposals necessary for conflict arbitration and consensus not only in Sudan but also among political forces in South Sudan [27].

The third factor is the creation and activity of the UNITAMS, which implements a peacebuilding operation in cooperation with the Sudanese government. As UN peacebuilding activities began at the request of the Sudanese government during the process of reducing UNAMID, the UNITAMS was developed to support the transfer to a democratic regime through the political transition period in Sudan. This is not only related to the second factor but also supports the Sudanese's willingness to resolve the problem and transform it into a democratic system. The initial mission was to support the complete withdrawal of UNAMID. The UNAMID mission ended on 31 December 2020, but the deadline for full withdrawal is 31 June 2021[29].

The mission did not limit the scope of the parties to negotiate to the transitional government, but saw it widely, including political party and civil society representatives, representatives of the military and armed groups, and continued to negotiate with groups that did not participate in the peace process even after the withdrawal of the UNAMID.

The strategic objectives of the UN Integrated Transitional Mission in Sudan(UNITAMS) are largely four. It is to support the development of democratic governance and sustainable peace for the operation of good offices, political transformation, protection, and promotion of human rights. To support the efforts of the transitional government, it also supports the draft constitution and technical support for election preparation and the implementation of human rights, equality, accountability, and constitutionalism. Second, the task force cooperates with the government to support the meaningful participation of Sudanese civil society, women, youth, refugees, domestic displaced persons, and members of the marginalized group. Third, it supports peace building, civilian protection, and constitutionalism, especially in the Darfur, Southern Kordofan, and Blue Nile regions. Four, it supports the economic and development assistance movement and humanitarian aid cooperation in Sudan in cooperation with international financial institutions. It ensures effective and integrated cooperation between United Nations agencies, funds and programs and expands cooperation with relevant partners.

The lifting of Sudan from the list of countries supporting terrorism written by the U.S. has created to overcome economic problems with the support of international financial institutions. External factors, such as the UNMITAMS's activities to support the complete withdrawal of the UNAMID and encourage additional actors who have not previously signed the peace treaty to participate in the peace process. The mediation and negotiation efforts of regional organizations have had a positive effect on the resolution of disputes by the Sudanese government and the transition to the democratic system.

### 4. Conclusion

Due to internal and external influencing factors, the democratization process of the Sudan regime seemed to be carried out smoothly. However, a military-led coup broke out again last October in 2021, and the function of the transitional government was suspended. Concerns in the international community have also increased. Meanwhile, civil forces' resistance to the military, which recently took power through a coup, is high within Sudan. In addition, it is not easy for government leaders to be changed by the military as in the past because civil society's will for democracy is not only strong but also is mature. International community arbitration and negotiation efforts, which are external influencing factors, have also resumed. Eventually, the military gave up the military-operated system and agreed to share power with the transitional government in mid-November 2021, a month after the coup[30][31]. The Prime Minister of the Transitional Government was reinstated. It shows that internal and external factors work together systematically to escalate tension after insecurity state.

Sudan is currently in the process of settling disputes and transitioning to a democratic state. However, positive factors such as the military and civil society's willingness to hand over to the civilian government through elections, reaching an agreement between the military and civil political forces peacefully in the process of resolving the coup, and the policy direction to a democratic state that appears in the bilateral declaration show that Sudan does not return to the past.

The U.S. measure to designate the state that supports terrorism has put pressure on the interim government in line with the Sudanese government's willingness to resolve the economic crisis that triggered anti-government protests. Political and diplomatic arbitration efforts by the United Nations and other international communities have prevented Sudan from going off track. Even though there was a possibility that the situation could worsen after the coup. The UNAMID peacekeeping activities ended after meaningful achievements, and the decision of the UN Security Council and the implementation of rapid peacebuilding activities, which decided to build peace in response to the request of the Sudanese government for sustainable peace, are also positive factors. In solving the Sudan problem, internal and external factors did not work separately. The two factors created a synergy effect by exchanging influences.

Even in disputes occurring between countries or within countries today, it is quite difficult to resolve disputes only with the efforts of the parties concerned. Even in the event of a coup amid ongoing international dispute resolution efforts, as in the case of Sudan, internal factors will inevitably be affected by external factors. The primary responsibility for problem-solving lies in the country concerned, but it is natural that external factors act to enable the country's spontaneous efforts to be expressed. Amid the emphasis on multilateral cooperation on common interests in the international community, the analysis of internal and external factors surrounding the country such as Sudan which contribute

to resolving conflict has many implications for us to revisit easing security tension between two Koreas in the Korean peninsula.

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# 6. Appendix

# **6.1. Authors Contribution**

	Initial name	Contribution			
	hame	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑			
Author	НК	<ul> <li>-Make a significant contribution to collection </li> <li>-Final approval of the paper </li> <li>-Corresponding </li> <li>-Play a decisive role in modification </li> <li>-Play a decisive role in modification </li> <li>-Significant contributions to concepts, designs, practices, analysis and interpretation of data </li> </ul>			
		-Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑			

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# Debate on the Correlation Between TERRORISM and Religion: Focusing on Salafi Jihadist

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#### Abstract

**Purpose:** The purpose of this study is, first, to organize the debate on the reductionism of the concept of limiting terrorism to non-state organizations. Second, we analyze the characteristics of culturally motivated terrorism. Third, we study the discourse on the ideological fiction and violence of Islam's Salafism.

**Method:** In the concept of terrorism by institutions or scholars studying terrorism, they point out errors limiting the actors to non-state organizations, explain religious terrorism and political and social contexts, and try literature research on logic and strategies that justify terrorism by interpreting Salafism as aggressive content.

**Results:** The reason why the actors who commit terrorism are limited to non-state organizations is because they are limited to the interests of specific countries or organizations. Historical examples of attempts at terrorism by the state are sufficiently accumulated in other studies. The reason for the occurrence of religious terrorism is not simply to realize a society where religious ideology is realized, but social discrimination and contradictions combine with religious ideology, resulting in terrorism. From this point of view, Salafist terrorism can also be interpreted.

**Conclusion:** Since the late 20th century, numerous terrorism has occurred mainly in Islamic society. Domestic and international disputes and system instability can provide an excuse for attacks on dissatisfied forces at any time, and incidents in which an unspecified number of people are attacked by groups armed with the name of religion will not be cut off. As so far, political oppression and military response alone are difficult to solve, so high-level complex strategies such as social reform and growth of anti-terrorism groups must be sought.

#### [Keywords] Non-State Organizations, Jihad, Salafism, Terrorism, Religious Obligations

### **1. Introduction**

Today, terrorism is occurring in the context of a modern national state. It was the rise of a bureaucratic state that could not be destroyed by the death of a leader that forced terrorists to expand their target range to create an atmosphere of public anxiety and reduce trust in the government. This reality has been at the center of more violent terrorism over the past 100 years.

Terrorism in the 1970s and 1980s took the form of small-scale terrorism by certain groups to elicit political concessions, but terrorism after the 90s is gradually showing a pattern of organization and scale while it is unknown by which terrorist organization the terrorism was committed[1]. In the early 1990s, many terrorism arose as extreme left-wing terrorism declined due to the end of the Cold War in the East and West, but demands for independence of minorities erupted from around the world, including Russia and Yugo, and radical Islamic fundamentalist forces spread.

Meanwhile, the number of terrorist incidents temporarily decreased in 1994 due to peace negotiations in Middle Eastern conflict countries such as Britain and Israel, but nationalism and Islamic fundamentalist terrorism have soared since 1995. Since 1997, racial separation forces in Asia and Europe have weakened, and fundamental Islamic forces such as Al-Qaeda have led international terrorism. In the 2000s, terrorism was temporarily lulled as a result of active counter-terrorism activities, but the Israel-Palestine bloody conflict and retaliatory war against the 9/11 terrorist attacks in the United States, especially the 2003 Iraq War, continued to increase anti-American and anti-Western terrorist incidents, creating anxiety for communities in the Middle East, Central Asia and North Africa. The 2010s was the era of the rise of ISIS and other Islamic terrorist organizations[2]. Recent terrorist organizations are characterized by forming a loose transnational network in religious and ideological ties rather than receiving support from specific countries like Al-Qaeda.

The history of all religions leaves traces of blood, and numerous modern terrorism has been practiced in the name of religion. Since the 20th century, some of the Muslim Sunnis in the Middle East and Central Asia have committed extreme terrorism armed with Salafi jihadists[3][4]. Representative groups that have committed dramatic terrorism since the late 20th century are Al-Qaeda, ISIS, and the Taleban.

Christianity, Judaism, and Hinduism have also committed violent actions against policies or movements that do not conform to their ideologies and ideas. However, the reason why many scholars are interested in Islam from the perspective of boundaries is that Islamists' terrorism has increased rapidly since the late 20th century. The so-called 'Salafi Jihadist group' has been treated as an object of threat to national security, and has been recognized as an object of hatred and fear, as it is often seen as a group committing terrorism in the media. Salafi Jihadist is considered an actor of rejection, resistance, and attack against a secularized society. However, in another case, other religious groups also launched attacks on secularized society. Examples include Lutheran attacks on Florida abortion hospitals, Christian armed groups throwing bombs at gay bars, killing radio talk show hosts in Denver, attacking Jewish daycare centers in Los Angeles, and Christian Monotheism's bombing of the Oklahoma Federal Building. Most of the religious terrorism in the United States was caused by Christian groups except for the September 11 terrorist attacks.

Analyzing religious terrorism occurring around the world away from the United States shows that Islamist terrorism is becoming more dramatic and larger than other groups. In addition, rather than simply realizing religious beliefs, the reasons for terrorism are complexly linked to inequality surrounding scarce resources, oppression of political and social freedom, and the injustice of foreign intervention that causes this situation.

In this paper, I would like to explore the relationship between modern Salafism and terrorism as a variant of Islam, the debate on the subject of terrorism, the role of religion in promoting terrorism.

### 2. General Debate over the Terrorism Actor

In the 20th century, the concept of terrorism had no consensus definition among scholars. According to Jackson, who analyzed 490 papers published in major terrorist research journals between 1990 and 1999, only 8 papers, or 1.6%, could be regarded as concept-oriented papers. In general, the term terrorism is used as a practice dealt with in the media, and scholars deal with terrorism without specifically presenting basic assumptions or conditions. Terrorism is a divisive concept in nature. The keywords in conceptualizing terrorism are ideology and movement. Most scholars present politics, ideology, religion, and economy as independent variables of terrorism[5]. Most terrorism occurs in the context of political struggles, one of the strategies of groups or countries attempting terrorism. However, most scholars and bureaucrats assume that the subject of terrorism is a non-governmental organization. It overlooks the fact that the government is implementing terrorism in many cases. A narrow example of the definition of the concept of terrorism can be found in the definition of the concept of terrorism by US government agencies[6].

The US FBI classifies international terrorism as international and domestic terrorism. International terrorism is a violent and criminal act committed by an individual or associated organization inspired or related by a designated foreign terrorist organization or state-sponsored organization[7]. Domestic

terrorism is a violent and criminal act committed by an individual or group for additional ideological goals resulting from domestic influences such as political, religious, social, racial, or environmental characteristics. The U.S. State Department also regards terrorism as "politically motivated planned violence, generally intended to affect the audience, perpetuated by non-combatants."[8].

This definition of concept also appears in scholars. Bruce Hoffman, for example, argument that terrorism has the following characteristics: "perpetrated by a subnational group or non-state." He argues that terrorism specifically has the following characteristics. 1)inevitable political nature in purpose and motivation; 2)designed to have a broad psychological impact beyond violent threats, direct victims of targets; 3)performed by organizations with identifiable command systems or conspiracy cells; 4)committed by sub-national groups or non-state entities[9].

In addition, Paul Wilkinson defines terrorism as non-state violence[10]. In response to this argument, Richard Jackson pointed out several problems. He argues that Bruce Hoffman argues that terrorism is committed by a transnational group or a non-state entity. There is a problem that the state's brutal torture or political oppression against citizens is not included in terrorism. Since the state has the power to use force, illegal violence against opponents for political and ideological purposes is excluded from terrorism. From this point of view, the definition of terrorism depends on the nature of legality, sovereignty, and violence. The actor-based approach to terrorism is wrong[5].

It is also dangerous to see terrorism from a reductionist point of view to characterize the whole of terrorism based on the interests and goals of the United States, given the broad range of terrorists, terrorist organizations, and motivation to support their chosen course of action. However, in the atmosphere of the post-Cold War in the late 20th century, the emergence of new independent countries, various conflicts in the Middle East, terrorism related to refugee issues in Europe, and the issue of Xinjiang Uighur in China were caused by non-state groups based on Islam[11]. The same is true of terrorism by right-wing groups in the United States and Europe. Often, terrorism by power groups occurs in dictatorships, but the number is insignificant compared to terrorism by non-state organizations. This does not mean that terrorism by the state should be excluded from the concept of terrorism. Terrorism can be an actor, whether it is a non-state or a state.

### 3. Religious Motivated Contemporary Terrorism

According to Tilly, the terms terror, terrorism, and terrorist do not identify causally coherent and distinct social phenomena but strategies that recur across a wide variety of actors and political situations[12]. And terrorists are linked to various organizations, environments, and beliefs[5]. Religious terrorism also justifies violence. The current culturally motivated wave of terrorism is not restrained, spreads indiscriminate violence, and is irrational. For religious terrorists, violence is, above all, a sacred act or sacred duty. Direct Response to Some Theological Needs Terrorism assumes a transcendental dimension, and thus terrorists are not bound by political, moral, or substantial constraints that appear to affect other terrorists[7].

However, similar to discussions on terrorism in general, current literature on religiously motivated terrorism lacks consensus on a definition and how it differs from traditional terrorism, if at all. David Tucker even argues that the term "religious terrorism" is not of much use because of confusion over its definition.

Scholars focused on apocalyptic, millennial, and or Messianic terrorism in studying religious terrorism. Religious versions of the apocalypse movement often focus on God's sudden, dramatic, upheaval intervention in history, human judgment, salvation of faithful selectors, and a puzzling revelation of the final rule of those chosen with God in the new world. The apocalypse that occurred in early Zoroastrianism was more fully developed in Judaism, Christianity, and Islamic apocalypse. However, it is not entirely a religious idea and is based on modern science, technology, political discourse, and conspiracy theory. Apocalypse have religious goals, but sometimes try to realize political goals. In order to prove apocalypse, violence that causes social

anxiety and fear is sometimes used against civilians and the government through collective activities[13].

In general, as with the discussion of terrorism, there is no consensus at all on how culturally motivated terrorism differs from traditional terrorism. Mark Juergensmeyer argues that culturally motivated terrorism emerged in the 1980sand was characterized by extreme cruelty and seemingly irrational motives and goals[14]. Bruce Hoffman argues that religion plays a role in justifying violence in religious terrorism[7]. A radical group belonging to a society with cultural continuity with a religious/political environment can be expected to continue to gain some support from people outside the group. In contrast, once turned into terrorism, the new religious movement will probably leave you fully alone without any support. In the 1970s, Italian and German universities may have environments for non-members who sympathized with 'the Red Brigade' or 'the Red Army', and there may have been environments for Muslims who sympathized with certain radical forces, but not many outsiders were ready to support or understand Aum Shinrikyo's terrorism[15][16].

There are situations in which terrorism directly inspires the terrorist movement and cognitive factors that provide opportunities for terrorism in the motivation to directly inspire the terrorist movement. Modernization is one of the causes of terrorism because it is vulnerable to the increasing complexity of society and economy and creates opportunities for terrorist attacks. Revolutionary ideologies can also easily spread across borders, paving the way for international terrorism or encouraging other countries to develop similar revolutionary ideologies, eventually developing terrorism. Another direct cause of terrorism is when the government cannot resolve specific complaints such as majority discrimination against minorities. Terrorism is also a means of resolving complaints from extremist factions. Lack of opportunities for political participation and social discrimination are important factors in the occurrence of terrorism. If a 'religious obligation' is given here, a more solid terrorist group is formed.

Religious groups that use terrorism have leaders that are recognized as legitimate by their followers, but do not necessarily possess bona fide qualities such as religious education or clerical training.

It is important for counterterrorism forces to pay attention to what religious terrorists attack, because these targets offer important clues for the groups' goals, which in turn affect the type of countermeasures employed. Groups that are focused on state targets are more likely to be vying for political control, whereas targeting other groups within the faith or other religions suggest a goal of religious cleansing. Mass casualties and damage that seem indiscriminate, illogical and excessive suggest apocalyptic aims. Just as there is more than one type of religious terrorism, there is more than one countermeasure to undermine a group's goals. Better understanding of such groups, their leadership and goals, will allow for a more nuanced approach and, hopefully, lead to greater success in undermining their message and their use of terrorism in the name of religion[13].

The goals of religious terrorists are not purely religious. Some terrorists would suggest that they could have immediate goals of religious, especially apocalyptic terrorists, while others could have political goals such as creating religious governments. Terrorists may use terrorism for the purpose of overthrowing a government that does not support the doctrine of a particular religion and establishing a religious government there. The cause of terrorist acts is to deviate from faith, but the goal is uniquely religious.

### 4. Salafism, a Variant of Wahhabism

Islamic society is a society where religion and politics are not clearly separated. Therefore, the state is operated and social order is maintained by religious discipline. Islam has the openness of doctrine. Paradoxically, the openness of doctrine is sometimes used in extremism. For example, ISIS existed as a branch of Al-Qaeda and then confronted Al-Qaeda when it was reborn

as an independent terrorist organization, and the ostensible reason was that it expressed a different view in interpreting Sharia. In pursuit of takfirism, ISIS chose a hard line, saying, "There are no restrictions on means for political benefit." Islamic fundamentalist leaders argued that aggression by external forces and control over Muslims brought about Muslim degradation and corruption, and that the solution to this was to expel foreign power through Muslims' jihad and restore to a "pure Islamic society."[17].

Jihad is usually related to Islam and Muslims, but in fact, the concept of Jihad is found in all religions, including political/economic ideologies such as Christianity, Judaism, Capitalism, Socialism, and Communism. Islam defines jihad as not only fighting back to protect itself, honor, assets, and homeland, but also striving for improvement. In addition, Jihad is interpreted as a struggle against evil inside or outside an individual or society. In Islam, Jihad aims for the following.

First, learn, teach, and practice Islam in all aspects of a person's life to reach the highest level of education to benefit himself, his family, and society. Second, be a Muslim lion everywhere, every action and action. Third, evil, injustice, and injustice must be fought by hand or mind. Fourth, respond to the demands of Jihad with money, effort, wisdom, and life. However, do not fight against Muslim brothers, Muslim countries, or non-Muslim societies that do not have agressive intentions against Muslims or Muslims. Fifth, no matter what excuse you make, suicide is not tolerated as a jihad in Islam. Sixth, converting people to Islam by coercion or coercion is never a jihad, but a crime and can be punished by law.

Since 2000, religious terrorism has been dominated by Islamic terrorism. These terrorist incidents occurred on a global scale, affecting major Muslim countries in Africa and Asia as well as countries in Russia, Australia, Canada, Israel, the United States, and Europe. Such attacks target Muslims and non-Muslims, with 80% of terrorist victims being Muslims. This is because Islamic extremist groups justify the punishment of unbelievers by armed jihad, and believe that unbelievers who violate Islamic law can kill even Muslims.

Surprisingly, however, there was no jihad in Islam. The term was coined in Europe during the Crusades and wars against Muslims. For current radical Muslims, Jihad is not only about the practice of religious obligations, but also about adhering to the traditions of Islamic society, rejecting corrupt and corrupt Western civilization, and practicing Salafism as a political-led ideology. Therefore, for Salafists, Jihad allows them to attack Muslims, not non-Muslims or Salafis.

Since the 1970s, rapid fluctuations in the global economic order have resulted in the strengthening of the political and ideological status of religion, which had weakened somewhat in front of the power of secular ideology and values in the 20th century, and close relations between religion and state. Selective affinity exists in the combination of religion and ethnicity [18].

Although the nature of Islam changed from one movement to another, the frustrations of the 1992 Algerian Muslims' election revolution, the Middle East peace ideology in the 1990s, political and economic openness of Arab countries, and 9/11 terrorism were triggers. Islamic terrorism, which occurred before and after 9/11 terrorism, was the product of the crisis of Islamism[19]. Islamic terrorism is divided into European-Palestine terrorism in the 1970s, national terrorism in Iran, Syria, and Libya in the 1980s, and terrorism targeting Western society and Islamic countries since the early 1990s[18].

Recently, the terrorists who have been adored by Islam are Salafists, and these groups are increasingly influential. <Figure 1> In the early 1990s, about 10 groups increased to about 50 by 2013. Salafism, a variant of wahhabism, is associated with policy-oriented and violent extremism. Salafists are typically exclusive, have a narrow character for local culture and other religions, and use the practice of jihad[20]. Figure 1. Number of salafi-jihadist groups by year, 1988-2013.



Note: RAND, a persistent threat(2014).

Religious interpretation does not use violence as a tool to distinguish between salafism and sufism. Salafism does not preach the holy war against pagans, but preaches the war against itself. Salafis is obligated to accept Sharia and regulates her own behavior. Many Sufis approach God through the intervention of religious leaders and believers. Salafis argues that nothing should be between man and God. From the 13th century to the rise of the Salafi movement in the 19th century, Sufism permeated Islamic discourse. In West Africa and Southeast Asia, Sufis still accounts for a significant portion of the Muslim population. Salafism is a conservative and behavioral form of Islam. Wahhabism is the official religion of Saudi Arabia today. Wahhabism, which began in Arabia in the 18th century, became a textbook for various Salafism groups[21]. Many Salafis accuse Sufism and local cultural practices of distrust of Islam's identity. Known as Takfir, this practice is one of the doctrinal roots of Salafi radicalism. Salafis' strategies include preaching, printing, the use of conversion tools in broadcasting and electronic media, participation in election politics, and violence jihad.

Muslims believe that declaring the five pillars of Islam, Shahadah, Salat, fasting Ramadan, donating zakat to the poor, and practicing pilgrimage(hadj) to Mecca. Salafi Muslims argue that the Sharia state is built on the basis of these religious beliefs. However, the new Islamic order is just a made-up tradition[22]. By the 1920s, the Islamic Reform Movement in the 18th century spread Wahhabism to Islamic society with the support of Saudi Arabia, and Wahhabism was established as a doctrine of Islamic Sunnis as it resisted foreign pressure that corrupted Islam. Wahhabism started from a movement that complies with religious obligations, but developed into an institutionalization that limits the behavior of the people, and turned into an ideological movement and the doctrine of terrorism of Sunni radical groups.

Organized Salafi movements first developed in Southeast Asia in the mid-19th century and in West Africa a century later. In both regions these movements focused on local concerns as well as on the trans-regional Salafi issues of theological and ritual purity. Wahhabism was incorrectly evolved into a variant of salafism, that is, 'political salafism'. Salafists, who have become variants, do not recognize the diversity of religion and sell the tolerance and non-violence of Sufism as pagan ideas. They treat liberal Muslims as demons and refuse political and economic

cooperation and coexistence with non-Muslims. The goal of the Salafist group's Jihad is not a struggle against the self, but a global victory for Islam. Salafism had no restrictions on the use of religious 'justified violence' against modernization and westernization.

There are researchers who argue that terrorism in Islamic terrorist groups tends to cause more victims than other terrorism. However, each Islamic terrorist group has different organizational characteristics and goal structures, and there are strategic and abstract groups pursuing secular national liberation or regime change movements, and the form and object of terrorism between groups may be different[23].





#### Note: START GDT(2020).

The correlation between terrorism and the religious promises of terrorist groups and actors has been the subject of extensive academic investigation. Although the focus has often been on extreme Jihad terrorism, other terrorist groups and individuals who made religious promises such as Baruchi Goldstein's attack on Hebron in 1994, American Christian identity groups, and Japan's Aum Shinrikyo have been widely discussed. For example, it is argued that many terrorists are "dedicated actors," and that members of a very conservative religion are typically dedicated actors. Religious-inspired terrorists such as the Taleban, ISIS, and Boko Haram are using operations to strengthen their self-control and maximize the number of casualties in the event of an attack. <Figure 2> In the future, very conservative religious terrorist groups will generally attempt more effective terrorist acts than non-religious or moderate religious groups[24][25].

Incidents and fatalities from Islamic terrorism have been concentrated in six Muslim-majority countries(Iraq, Afghanistan, Nigeria, Pakistan, Somalia, and Syria), while four Islamic extremist groups(ISIS, Boko Haram, the Taliban, and al-Qaeda) were responsible for 74% of all deaths from terrorism in 2015. These groups all have Salafi or other Sunni beliefs.

### **5.** Conclusion

The reason for paying attention to Islam is that terrorism linked to Muslim groups is occurring around the world, and there is a widespread biased perception that "the religion of Islam is radical and pre-modern." However, if you try to understand more deeply the causes of Islamic terrorism, you will find out that corruption, inequality, discrimination, and oppression exist in that society. Like the theory of civilization conflict, it is difficult to resolve Islamic terrorism only with a partial and dichotomous perspective. Islamic radical salafism is growing into a variant fungus within the culture of terrorism. Most Muslims hope for a peaceful and intact world, but very few violent groups are trying to aggressively interpret and apply Islamic doctrines to society, and their political and social greed is being realized through numerous sacrifices by them.

The new terrorist of the late 20th century is an extension of traditional terrorism, but it operates across borders and takes the form of an international network with access to advanced technology[26]. New terrorism is an anti-order of the new world order in the 21st century and seems to be strongly influenced by religious inspiration. New terrorism has three main characteristics as follows. It was inspired by the rise of nationalism and separatism, extremism, fundamentalism, and religious factionalism.

Recently, the network of terrorist organizations is not limited to one country but is distributed worldwide. To crush them, a multi-spectrum anti-terrorism strategy is needed that requires multinational and multidimensional mobilization of diplomatic and economic means as well as military means. In order to cope with terrorism, it will require a high level of information to prevent and prevent terrorist outbreaks rather than large-scale military forces. In particular, long-term social reform pressure is needed before external military intervention in response to terrorism.

Internally, consensus and practice by local members are needed to resolve social/economic discrimination prevalent in Islamic society, and there is a task of fundamentally breaking down the pre-modern political system and incorporating it into a democratic system. Externally, the international community should support groups that can compete ideologically and culturally with them as strategies against terrorists to grow.

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# 7. Appendix

## 7.1. Authors contribution

	Initial name	Contribution		
		-Set of concepts ☑		
		-Design 🔽		
		-Getting results 🔽		
		-Analysis 🔽		
		-Make a significant contribution to collection 🛛		
Author	sc	-Final approval of the paper  🗹		
Author	50	-Corresponding 🔽		
		-Play a decisive role in modification $\ igside{ u}$		
		-Significant contributions to concepts, designs,		
		practices, analysis and interpretation of data $arnowdynambol{Q}$		
		-Participants in Drafting and Revising Papers 🛛		
		-Someone who can explain all aspects of the paper $\ igsilon$		

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# A Study on the Economical Design of Protection Facilities through EXPLOSION TEST and Simulation

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#### Abstract

**Purpose:** In this study, the possibility of economical design of a protective structure was presented based on explosion test data and computer simulation results on the safety of both a building and human bodies for the combat training building.

**Method:** A training facility was built for soldiers to experience the vibration, pressure, and noise generated inside the building due to the explosion of the TNT. In the explosion proof test, 9lb of TNT, equivalent to the weight of a 4.2-inch mortar shell, was detonated in four places around the building, including the roof of the training building, the door, and the outside of the wall to determine the damage. Vibration, pressure and noise transmitted into the building were measured. After the explosion test, the damage to the building was examined through a rebound hardness test and visual inspection, and the impact on the human body was estimated by measuring the pressure at three spots inside the building. Afterwards, computer modeling and simulation was performed using High Explosion Damage & Injury Assessment Model(HExDAM) and simulation results were compared with explosion test measurements.

**Results:** As a result of inspecting the structural damage of the building, there was no significant displacement of the structure and it was determined that there was no problem in using the building. The compressive strength of concrete was observed through Schmidt hammer, it showed 96% of the strength compared to the design strength(30MPa). The pressure inside the building was measured in the range between 0.063 and 0.488 kPa, which is a very small value that is harmless to the human body. According to computer simulation, the internal pressure increased as the wall thickness decreased. However, even if the wall thickness was reduced, the pressure delivered to the inside did not increase significantly, and it was still found to be harmless to the human body.

**Conclusion:** Through the explosion test, it was confirmed that the structure and personnel inside the training building for combat field experience were safe enough against the explosive power of a 4.2-inch mortar shell. Computer simulations showed that there is room for reducing the thickness of the wall of the building, and the necessity of economical design was suggested by using computer simulation for designing protection facilities and military facilities.

[Keywords] Blast Effects, Explosion Test, Reinforced Concrete Building, HExDAM, Modeling & Simulation

# 1. Introduction

Countries around the world are preparing for an artificial intelligence war based on the 4th industrial revolution[1][2][3][4]. However still, conventional types of combat will not disappear, and individual combatants will inevitably be exposed to the noise and vibrations of explosions. Visual and auditory effects can be reproduced through audiovisual materials, but smells and vibrations are limited to implement in traditional audio video training system. A practical training plan is needed to overcome these limitations and overcome the fear of combatants who will

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be exposed in battlefield situations. In addition, there have been several reports in the U.S. military of fighters having hearing problems due to explosions and shooting drills[5][6][7][8]. It can be seen that there is a tendency to complain of abnormalities in mental health such as post-traumatic stress disorder(PTSD) according to psychological pressure on the battlefield and un-ethical situations[9][10][11][12][13][14]. In order for a soldier to perform a successful military operation, it is necessary to prepare physically and mentally to complete the mission even in various stressful situations and, recently, stress Inoculation training using Virtual reality(VR) is attracting attention[15][16][17]. Efforts to prevent safety accidents that occur in the course of various types of training conducted in the military must be made essential[18]. Explosion demonstration test is thought to be able to help prevent safety accidents of buildings and personnel in advance. Baek suggested that economical design of protection facilities would be possible through computer simulation if data accumulated through empirical experiments were used[19].

The Republic of Korea Army designed to experience vibration and noise inside a building that simulates real-world situations in order to help combatants overcome fear on the battlefield. Assuming the situation of the infantry unit, the weapons expected to be used by the enemy were limited to mortars. The facility for the experiment was built at the mortar shooting range in the eastern front region of the Korean Peninsula. The training facility is a reinforced concrete building with a width of 15m and a length of 8.4m that can accommodate 60 people. The thickness and design strength(fck) of concrete are 62 cm and 30 MPa, respectively. The diameter and tensile strength of the rebar are 20 cm and 400 MPa, respectively. The roof of the building is covered with soil with a thickness of 1m. In addition, explosion-proof doors and valves were installed in the building to withstand blast pressure. The battlefield noise and vibration experience facility is about 250m apart from the target point of the mortar. In this paper, based on the results of the explosion demonstration test, the safety of the experience facility was determined, and the pressure on eardrums and lungs damage was simulated using Breeze HExDAM and the results were compared. Through this, it is intended to present the possibility of economical design application through simulation compared to the explosion demonstration test. Here, the meaning of "economical" is limited to reducing the use of materials by making the wall thickness of the building thin.





# 2. Experimental Test for Stability and Safety

Although the distance between a mortar shooting target and the experience facility were separated by about 250m, an explosion demonstration test was conducted assuming the worst situation in which the mortar shell fell on the roof or around the building. The location and order of the explosion were as follows : in front of the protective wall at the main entrance, by the front outer wall, by the left outer wall, and on the roof(<Figure 1>). Test was conducted at intervals of 30 minutes for each location. The 4.2-inch mortar bomb exploded on a earth-covered roof, and the TNT 9lbs exploded 2.5 meters from the wall in three other places. In the event of explosions around the building, blast pressure and noise inside the building were measured in three spots. The TNT explosive device was placed in an enclosed facility installed 300m away from the training building. Blast pressure and noise were simultaneously measured inside the building using DEWETRON/DEWE-2601. For safety, security guards were deployed, a warning was broadcast, and a firefighters were placed on the test site. In addition, Explosive Ordnance Disposal (EOD) was waiting to be dispatched in case of an unexploded bomb. After an explosion by location, the status of the pressure monitoring equipment was examined and the readings were recorded. The change of the structure before and after the explosion test was measured. Changes in the structure before and after the explosion were measured. The inside and outside of the building were visually inspected for cracks and damage. The explosion pressure and noise measured at different locations inside the building were recorded. The explosive charge of a 4.2-inch mortar shell is 3.22 kg, and an additional 20% safety factor is taken into account and a total of 9lbs of TNT is assumed to explode on the roof or around the wall of the building. When the mortar shells were detonated on the roof, the angle of incidence was assumed to be 10 degrees. In this case, the angle of incidence means the angle between the vertical line of the roof and the trajectory of the shell. The explosion proof test procedure is shown in <Figure 2>.

#### Figure 2. Explosion proof test procedure.



Before the test, the safety evaluation factors of the facility are visually inspected for cracks inside and outside the building, and the compressive strength of concrete is estimated from measurement of a Schmidt hammer. The readings from Schmidt hammer were converted to compressive strength using a couple of conversion equations and averaged as final estimates[20][21]. The safety of the building after the explosion was evaluated by the change in the compressive strength of the concrete and the cracks on the wall. The compressive strength of concrete was compared with the design standard strength(fck, 30 MPa) by measuring the compressive strength using Schmidt hammer before and after the test. The cracks on the building was inspected through visual inspection. In order to confirm the safety of personnel who will experience vibrations and noises that may occur in battlefield situations inside the building, the magnitude of pressure and noise intensity were measured.

## 2.1. Stability of the building

Figure 3. (From left to right) building facade exterior wall, condition of exterior wall before and after the test.



To evaluate the stability of the building, the rebound hardness of the front wall of the building was measured using a Schmidt hammer, a type of non-destructive test, before and after the explosion test. The design standard strength was 30 MPa, and the rebound hardness measured with a Schmidt hammer before the explosion demonstration test was 27.9 MPa. The average value was calculated by measuring the rebound hardness for a total of 20 points at intervals of 3cm from the 4 locations where the explosion test was conducted. On the other hand, visual inspection to determine the presence or absence of abnormalities in the building was conducted at five points in the building. Before the test, the inside and outside of the building were inspected for cracks and compared with the state after the test.

#### 2.2. Safety of personnel inside the building

Shock wave pressure and sound pressure were measured at three locations inside the building, including the entrance hall, the entrance, and the center of the hall, to determine the damage to the personnel inside the building. The shock pressure was measured using the PCB Inc model no 137B23B sensor, and the equipment specifications are shown in <Table 1>. Sound pressure was measured with model no 2541 of PCB Piezotronics Inc, and the equipment specifications are shown in <Table 2>.

Item	Value	
Max. pressure	345 kPa	
Non-linearity	< 1%	
Measurement range	50 psi(345 kPa)	
Sensitivity	(±15%)100 mV/psi(14.5 mV/kPa)	
Resonant frequency	>=400 kHz	
Electrical connector	BNC jack	
Weight	12.4 oz(352 gm)	

**Table 1.** Shock pressure acquisition system specification.

 Table 2.
 Sound pressure acquisition system specification.

ltem	Value
Frequency range	3.15~20kHz, max. pressure
Nominal microphone diameter	1/2"
Frequency response characteristic	Free-field
Frequency range	(±1dB)5 to 10000 Hz
Dynamic range	>146 dB re 20 µPa
Electrical connector	BNC jack
Weight	12.4 oz(352 gm)

Among the organs of the human body, especially the eardrum and lungs are most vulnerable to pressure[22]. <Table 3> and <Table 4> show the threshold values for the most sensitive tympanic membrane and lung injury in the human body[23][24][25][26].

 Table 3. Human ear drum damage due to blast pressure.

	Maximum effective overpressure				
Type of damage	kPa	psi			
Threshold of eardrum rupture	35	5.1			
50 percent ruptured eardrums	325 and above	47.1 and above			

Table 4. Human lung damage due to blast pressure.

Tuno of domono	Maximum effective overpressure			
Type of damage	kPa	psi		
Threshold	210 to 280	30.5 to 40.6		
50 percent damaged lungs	325 and above	47.1 and above		
Threshold of lethality	700 to 850	101.5 to 123.3		
50 percent lethality	900 to F00	130.5 to 188.5		
Near 100 percent lethality	1400 and above	203.1 and above		

Figure 4. Peak sound pressure levels and B-duration limits for impulse noise for impulse noise in personnel-occupied areas[27].



According to MIL-STD-1474D, as shown in <Figure 4>, hearing protection is mandatory when the maximum noise level exceeds 140dB, and the threshold noise level based on the evaluation level is defined as 177dB[27]. And while wearing single protection(earplugs or earmuffs), based on the permitted number of times per day, 2000, 100, and 5 lines of Z-curve, Y-curve, and It is defined as an X-curve and stipulates that it must not exceed the Z-curve. If double protection(earplugs and earmuffs) is worn, it is allowed up to 20 times as much as when wearing a single hearing protection device.

# 3. Results

## 3.1. Cracks and damage of the building

As a result of inspecting the cracks and damage of the structure, there was no significant change in the crack width before and after the test. The front surface of the test site was partially damaged by debris, but not enough to cause structural problems. The aging condition of the finishing materials was checked(destruction of the ceiling material and waterproofing layer), and some of the finishing materials of the ceiling urethane fell off or cracks occurred due to vibration. After the explosion test, an explosive crater with a depth of 38 cm was generated on the surface of the earth-covered roof.

### 3.2. Non-destructive testing

As a result of non-destructive testing, there was no significant change in the compressive strength of concrete before and after the test. Through the inspection before the test, cracks of 0.1 to 0.4 mm were identified on the building surface. A total of 24 cracks were identified outside the building. Inside, two microcracks were identified on the wall of the warehouse. The grill window of the explosion-proof valve was partially deformed. Due to the site conditions, the non-destructive rebound hardness test was conducted on the front outer wall, and 20 points(4 points on the left and right x 5 points on the top and bottom) were measured with a Schmidt hammer at intervals of 3 cm on the outer wall close to the test location before and after the demonstration test. The estimated strength was measured to be 28.9 MPa(<Table 5>). This was the strength level of 96% of the design strength of 30 MPa, and there was no significant difference in strength change compared to the strength before the test.

Measure	Rebound value		Rebound value		Rebound value		Mean value	Estimated strength	Compressive strength(MPa)
Before the test	47	40	43	43		Eq.1: 40.0			
	40	42	45	40		Eq.2: 38.0			
	48	42	34	45	43.4	Eq.3: 41.7	27.9		
	44	44	42	44		average: 39.9			
	43	44	44	44	_	age: 0.70			
	45	45 47 42		Eq.1: 42.0					
After the test	43	44	47	46		Eq.2: 39.5			
	45	44	40	49	44.5	Eq.3: 42.5	28.9		
	42	43	46	45		average: 41.3			
	45	45	43	43		age: 0.70			

Table 5. Rebound hardness test values and estimated compressive strength at the front wall.

 $Note: {\tt Eq.1:} The value corresponding to the impact strength in the rebound hardness curve marked on the schmidt hammer.$ 

Eq.2: F=13Ro-184(Japanese society of materials science and technology).

Eq.3: F=7.3Ro+100(Architectural institute of Japan).

The age was calculated as 0.70 after 344 days of construction.

## 3.3. Blast wave overpressure and sound pressure

<Figure 5>, <Figure 6>, <Figure 7>, <Figure 8> show the explosion pressures measured at three points inside the building when 9lbs of TNT is detonated, respectively, in front of the entrance barrier, in front of the front exterior wall, in front of the ventilation opening on the left side of the building, and on the earth-covered roof. <Figure 9>, <Figure 10>, <Figure 11>, <Figure 12> show the sound pressure observed inside the building when the explosions were carried out at the same location around the building.

Figure 5. Blast wave pressure detonated at location #1.



Figure 6. Blast wave pressure detonated at location #2.



Figure 7. Blast wave pressure detonated at location #3.











Figure 10. Sound pressure detonated at location #2.



Figure 11. Sound pressure detonated at location #3.



Figure 12. Sound pressure detonated at location #4.



<Table 6> shows the summery of measured blast wave and sound pressure at different blast locations. As can be seen in <Table 6>, all measured shock wave pressures were analyzed to be less than 0.071 psi(0.488 kPa). It can be seen that the shape of the pressure change graph over

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time is not the pattern of a typical blast pressure curve, but the shape of the vibration of a building[28][29][30][31]. Therefore, it can be understood that the storm pressure transmitted to the inside of the building is insignificant.

Location	Channel	Blast wave	Sou	Sound wave	
	Channel	Peak ov	erpressure(Pa)	B-duration(msec)	
	#1	90	149(137dB)	808	
Near the	#2	339	400(146dB)	698	
chiranee	#3	488	400(146dB)	658	
By the front wall	#1	196	110(135dB)	700	
	#2	148	136(137dB)	651	
	#3	401	400(146dB)	413	
	#1	74	110(132dB)	696	
At the left side of the building	#2	127	136(135dB)	777	
	#3	310	400(146dB)	379	
On earth covered roof	#1	63	62.1(130dB)	794	
	#2	88	72.8(131dB)	826	
	#3	272	197(140dB)	632	

 Table 6. Blast wave and sound pressure measurements.

## **3.4. HExDAM simulation**

HExDAM is a 3D explosion modeling software that allows users to estimate injury and damage resulting from the high explosion[32][33][34][35]. Explosion models in HExDAM compute highest incident pressures and provide structure damage and personnel injury levels using experimental structure vulnerability records. It can be derived by observed pressure values which produce moderate and severe damage and injury levels at certain explosion yields. This model is simple to use compared to the Computational Fluid Dynamics(CFD) program. When refined modeling is required, CFD type software should be used, but HExDAM is simple and easy to understand the results, and thus it is evaluated as an economical program by providing only necessary information. The strength of HExDAM is that it can predict how much damage to buildings and human bodies would be caused by the amount of overpressure and impact generated with detonation of high explosives, and process and present the results faster than other software. HExDAM can model damage on 28 body components such as eardrums, skull, larynx, lungs, ribs, etc. In this study, an explosion simulation was performed by modeling a building in 3D and placing virtual personnel inside it. We simulated the explosion of 9lbs of TNT at 2.5 meters from the front wall of the building, and analyzed the damage to the eardrums and lungs that the person sitting inside the building would suffer. <Figure 13> is screenshots of a training facility modeled by HExDAM and 9lbs of TNT detonation in front of the building.



Figure 13. HExDAM simulation screenshots: (left) a man sitting inside the building(right) explosion by the front wall.

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No.	Body components	Dmg/Inj(%)	Over press.(psi)	Dyn. press.(psi)
1	Right eardrum	0.5	0.0196	9.32E-06
2	Left eardrum	2.5	0.198	0.000949
3	Skull	0	0.192	0.00089
4	Larynx	2.7	0.19	0.000876
5	Cervical vertebrae	0	0.19	0.000876
6	Clavicle	0	0.188	0.000856
7	Lungs	0	0.182	0.000804
8	Ribs	0	0.182	0.000804

Table 7. Pressure on human body components due to explosion by the wall, measured in the center of the hall.

In the <Table 7>, overpressure and dynamic pressure, damage and injury level applied to each part of the body according to the explosion were presented. The level of damage to the human body was very low in most body components, but eardrums and larynx were higher than other organs. However, the level of damage is still very low and safe. Through the results of the explosion test conducted around the training building with a wall thickness of 620 mm and the results of the HExDAM simulation, the change in pressure on the eardrums of personnel inside the experience building was investigated according to the change in wall thickness. HExDAM simulation shows that measured overpressure from the explosion test agrees with 67% and 27% near the entrance and by the wall, respectively. As presented in <Table 8>, the smaller the wall thickness of the building, the greater the internal pressure but there was no significant difference. Considering the blast overpressure itself inside the building, reducing the wall thickness is not a big issue.

 Table 8. Overpressure vs. wall thickness simulation result from HExDAM.

Detonation location	Measured overpressure	Front wall thicknesses(mm) vs. overpressure on the eardrum(psi)					
		ТНК 620	ТНК 500	ТНК 400	ТНК 300		
Near the entrance	0.013	0.0196	0.0276	0.0344	0.0413		
By the front wall	0.028	0.103	0.494	0.511	0.528		

## 4. Discussion and Conclusions

As a result of this study, conclusions were drawn as follows:

(1) It was confirmed that there was no structural damage due to the explosion, and the concrete strength did not differ from that before the test. In conclusion, as a result of the explosion test, there was no defect in the safety of the building due to the explosion.

(2) As a result of the explosion test, it was measured to be less than 0.071psi(0.483kPa), and the shock wave pressure on eardrums sit in the center of the hall is found to be 0.2psi(1.379kPa)by the simulation.

(3) The sound pressure measurement was below the impulse noise unit W, so it is judged harmless to the human body as it is exposed to noise without any protective equipment in most places in the building. According to the results of the explosion test, the sound pressure measured at four spots inside the building was measured to be less than 149Pa at the maximum. Inside the building, the sound pressure was measured below 160 Pa, which is a standard that does not affect personnel without protective equipment.

(4) The safety of the training building against 4.2-inch mortar is confirmed through experimental explosion test. After explosion, compressive strength was 96% over the design strength and there was no significant additional displacement or deformation found. Overpressure measurements inside the building are much lower than safety threshold.

(5) The traditional design method shows that protective structures are safely built, but they are designed as excessively thick walls, which can lead to waste of materials. Simulation shows that there is room for reducing wall thickness. However, the simulation only considered the thickness of the front wall and the effect of pressure on the eardrums. Comprehensive design is needed considering not only overpressure but also possible penetration effect and sound wave, etc. In this study, the possibility of economical protective structure design was suggested with the fusion between accumulated data from explosion tests and explosion computer simulation.

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# 6. Appendix

# 6.1. Author contribution

	Initial name	Contribution
Lead Author Corresponding Author*	SB	-Set of concepts 🔽
		-Design 🗹
		-Getting results 🔽
		-Analysis 🔽
		-Make a significant contribution to collection 🛛
		-Final approval of the paper 🛛
		-Corresponding 🔽
		-Play a decisive role in modification $\ ar{ u}$
Co-Author	SK	-Significant contributions to concepts, designs,
		practices, analysis and interpretation of data $ararsigma$
		-Participants in Drafting and Revising Papers 🛛
		-Someone who can explain all aspects of the paper $\ arsigma$

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# Study on Legal and Institutional Measures for the Strengthening of DEFENSE SPACE POWER

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#### Abstract

**Purpose:** In preparation for the great security threats surrounding the Korean Peninsula, it is urgent to establish defense space capabilities to acquire prior information and secure precise response capabilities. It is also urgently necessary to establish a military utilization plan for the Korean-style independent navigation satellite, which is reflected in the mid-to-long-term national space development plan.

**Method:** This study used the following research method. First, I predicted the importance of space in defense and the aspect of space war. In addition, it analyzed the trend of strengthening the defense space of countries around the world and derived implications for strengthening Korea's defense space. Based on this, the revision of the law and the improvement of the system were proposed to strengthen Korea's defense space.

**Results:** Revision of Laws and Regulations for Strengthening National Defense Space. The amendment of the Space Development Promotion Act should be made as soon as possible. It is to establish a legal basis for the military to pursue space development on its own. The first option is to enact a law to strengthen the defense space force(special law). The second plan is to revise the current 'Space Development Promotion Act', add and strengthen security-related clauses. Korea's Defense Space Strategy Development Direction is to strengthen co-operation with advanced countries including the United States for space security, effectively responding to space threats and space risks, and strengthening civil-military space cooperation.

**Conclusion:** While first pushing for the enactment of a special law through the legislation of lawmakers, it will be appropriate to insert and revise provisions related to defense space in the current laws(such as the Space Development Promotion Act, the Defense Business Act, the Armed Forces Organization Act, the Aerospace Industry Promotion Act, etc.). It is necessary to give the defense minister full authority on issues related to defense space, and on the other hand, it is reasonable to carry out legislative activities in a way that does not go against the cause of "peaceful use" of the international community. In addition, efforts should be made to expand systems and organizations to strengthen the defense space and train experts.

[Keywords] Defense Space Power, Space Capabilities, Space Development Promotion Act, Space Law, Defense Space Strategy

# 1. Introduction

In the Fourth Indus-trial Revolution era, the advent of state-of-the-art weapon systems has changed not only the paradigm of warfare but also the military's traditional nature and mission area. To respond to security threats and future warfare, the military seeks various measures and equip advanced weapon systems [1].

The Fourth Indus-trial Revolution Smart Defense Innovation Promotion Group is actively implementing a smart defense innovation promotion plan with the vision of realizing 'Digitalized Strong Military, Smart Defense.' To be specific, 'smart defense innovation' is a key means of implementing Defense

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Reform 2.0, and the main focus of smart defense innovation is to change from a troop-centered military power to a science and technology-centered one, and to apply the 4IR technology to the entire area of national defense[2].

So far in the 21st century, the new ways of making war are marked by the methods of confrontation and the objectives to whom the attacks are being directed, therefore, the following are the forms of wars that are being marked and will maintain in this century: 1)Fourth Generation Wars or Asymmetric Wars, 2)Hybrid Wars, 3)Fifth Generation Wars and 4)Wars in Cyberspace or Space Wars[3].

In the half-century, since the first launch of Sputnik 1, it has become impossible to consider economic, political, or scientific human life in the communication field without reference to outer space. As proved in the recent Iraq, Gulf, and Kosovo Wars, Space capability necessary actor of modern warfare. Space power is becoming a barometer of national power. 21st Century many nations participate in space activities either directly or indirectly. Because of the importance of space and security interests, China, Japan, the EU, as well as USA and Russia, spur military and commercial space development[4].

Conflict in space is inevitable. No frontier exploited or occupied by humans has ever been free from strife, but the United States has a chance to mold and shape the resolution of such conflict in the future. Opportunities exist through both formal and informal negotiations to define the commons of space and the rules of the road. According to Gray, future warfare will include war in space, at least warfare to contest the control of space[5]. As we call the 19th century ruled the sea and the 20th century ruled the sky, the "space era" is coming to dominate the space in the future[5].

During the 2000s there were several noteworthy events creating orbital debris. China's 2007 ground-launched ASAT missile test is estimated to have generated over 3,000 pieces of trackable space debris<sup>[4]</sup>. In addition, space activities by the private sector are expanding from space activities led by the state to developed countries. It appears to be the use of peaceful and commercial space, but in reality, the universe is being used militarily for its interests, or peaceful and commercial use can be converted to military use. Also, we have to face the fact that the universe is moving further from scientific exploration to commercial use to military use. "State Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner. The international community includes the military use of the universe, which is intended to be "non-aggressive "under international law of "peaceful use of the universe." In addition, the Republic of Korea, as a member of the Space Club following the Naro launch in 2013, is expanding the development of space technology and space activities. Legal and institutional preparations should be fully preceded based on the understanding and utilization of the space of the international community, especially in advanced countries. ROK's space-related legislation has a strong view of the universe as an object of science and technology and does not reflect the importance of security for the military use of space. Recently, countries around the world have recognized space as an important military operation area in modern warfare and are accelerating space development. In particular, the strengthening of space power, including China and Japan, is underway in Northeast Asia, and space power is expected to be an important factor in the future. As a result, Korea also needs to lay the groundwork for the military use of space to prepare for future war. In addition, the Ministry of National Defense seeks to strengthen its defense space capabilities based on the "National Defense Space Development Plan." In particular, the development of defense space forces in China and Japan, as well as North Korea's nuclear tests and missile launches, are likely to pose a significant threat to the security of the Korean Peninsula while destroying the balance of power due to asymmetric forces. In preparation for the great security threats surrounding the Korean Peninsula, it is urgent to establish defense space capabilities to acquire prior information and secure precise response capabilities. As a monitoring and reconnaissance force that can detect the movements of North Korea's mobile missile launchers, it is

urgent to deploy reconnaissance satellites and independent early warning satellites against North Korea's nuclear and missile launches. It is also urgently necessary to establish a military utilization plan for the Korean-style independent navigation satellite, which is reflected in the mid-to-long-term national space development plan. The ROKAF has presented a vision of 'building a smart air force based on advanced technology and skills' applied with new technologies in the 4IR era to prepare for future battlefield environments and set the goals of work innovation and combat power enhancement through intelligent aerospace operation schemes and highlyefficient military operation environments [1].

The ROKAF has presented development directions for all aerospace power fields, selected five flagship projects to improve core future capabilities for a quantum leap that represents a big move forward, space development plans and tasks, and reflected them through Air Force Quantum 5.0[6].

To be specific, the 4IR has resulted in the rapid progress of defense innovation and changes in all areas of scientific techniques, technologies and, information, such as unmanned autonomy, 3D printing, robotics, artificial intelligence, the Internet of Things, big data analytics and gene editing. Based on this, the military has plans to build a system capable of applying the required state-of-the-art weapons and 4IR technologies to national defense, and to raise its defense R&D technology to the 7th ranking in the world[7].

The major roles of the ROKAF as a space force include ground and space surveillance and reconnaissance, early warning, and space object surveillance. A space military power refers to the ability to carry out operations for military purposes based on space. The main components of the space military power comprise various areas, such as intercontinental ballistic missiles(IC-BMs) that pass through space(atmosphere), military satellite systems, artificial satellite interception systems and anti-satellite weapons(ASAT) to destroy and disable them, and high-level aerospace technologies including space fighters.

According to the Ministry of National Defense's  $\lceil '21-'25 \text{ Mid-Term Defense Plan} \rceil$ , the air and space fore are expected to secure air and space dominance in the theater of war on the Korean Pen-insula, possess capabilities for rapid air track detection and precision strikes, and promote the performance improvement of fighters from the existing KF-16 and F-15K fighters to the 4.5-generation fighters upgraded with AESA radar, which offers a first-look, first-shot and first-kill capability, and complete the planned introduction of the F-35A, a stealth fighter, to secure air superiority in both wartime and peacetime.

### 2. Foreign National Defense Space Forces

When the Space Act was signed in 1967, it was considered a "peaceful use of space for national security purposes." In particular, countries are expanding the military use of the universe in various ways, meaning "peaceful use." Deganit Paikowsky has provided an insightful arrangement for those considered to be in the "space club," which can be used to differentiate between the levels of emerging, medium, and great space powers[8]. Using Paikowsky's framework, emerging space powers include the numerous states that indigenously can develop, maintain and control satellites but that are unable to launch them through indigenous means. There are many countries within the group, but examples include Canada and Saudi Arabia. Medium space powers include those states with the indigenous capability to launch, develop, and control satellites[9].

The United States, the world's largest space power, is still trying to maintain its superior position in space. The United States recognizes the universe as a very important element in terms of organization, budget, and strategy, and is putting in physical and human resources. The U.S. recognizes space as a superior and exclusive area not hindered by any force in the military sphere. The "New Space Policy" (Oct. June) announced its plan to explore manned Mars in 2030, and the "National Security and Space Policy" (November) declared the recovery of U.S. space leadership. President Trump has advocated a U.S. space priority and created a space force. He operates more than 500 satellites and is developing ground and deployed space weapons across the entire range of surveillance, reconnaissance, communication, and navigation. President Donald J. Trump is Unveiling an America First National Space Strategy on March 23, 2018. He announced as follows;

"Our travels beyond the Earth propel scientific discoveries that improve our lives in countless ways here, right here, at home: powering vast new industry, spurring incredible new technology, and providing the space security we need to protect the American people" [10]. Lead global space development based on various space development capabilities. Continue the development of space weapons, including rocket weapons systems (2007, experimental success), laser weapons, and parasitic satellites. It is expected to secure space operational capabilities for defense and attack. Japan is planning to establish a foundation for military space development and expand systematic space development under the enactment of the Framework Act on Space in 2008. It has developed 34 satellites and solid rockets for five years since 2009, intending to develop unmanned moon exploration sites for 20 years. It has been operating more than 40 satellites including communication satellites and aims to operate four reconnaissance satellites(EO 2, SAR 2) for reconnaissance of the Korean Peninsula in the wake of North Korea's missile test launch(August '98, Taepodong 1), and a space solar power plant that can be used as an energy source for space laser weapons depending on the purpose of use. It has removed the "peaceful space development" clause through the revision of the JAXA Installation Act(in 2012) and promoted the development of space power in earnest. It has revised security regulations under space law and pursued various international cooperation related to space security. It has opened a space dialogue channel between the U.S. and Japan and upgraded the JAXA to an organization organized by the Prime Minister.

China's meteoric rise as a space power has been striking. With its manned space program starting in 2003, its anti-satellite testing in 2007, 2010, and 2013, and its plan for a large space station by 2020, the achievements illustrate how rapidly China has matured as a space power[11]. It is assessed that this test helped improve Chinese anti-satellite systems. In May 2013, China conducted a self-described "high-altitude science mission," which was assessed by the U.S. Defense Department to be a counterspace test designed to reach satellites in geostationary orbit[12].

China has been promoting space development since '58 as part of its defense strategy, challenging the space hegemony divided into the U.S. and Russia due to the success of the lunar probe('Chang'e 1 in 2007, Chang'e 2 in 2010), and the spacewalk(Shenzhou 7 in 2008), and is operating more than 100 satellites, including reconnaissance and telecommunications, intending to complete the space station by 20'. Since 2000, Russia has been pursuing a policy aimed at economic growth and a return to a powerful nation due to rising international oil prices. The Soviet Union had a long history of anti-satellite programs and military use of space. The Fractional Orbital Bombardment System—during the 1960s and before the signing of the Outer Space Treaty—was a development program to deliver nuclear warheads to Earth from low Earth orbit[13]. The weapon system was a combination of a low-flying missile and nuclear warhead, and it was designed to take off from the Soviet Union and deorbit when attacking. More importantly, it would not fly over the Arctic to reach the United States, but would rather traverse the southern polar areas and reach the United States via the "backdoor" [14].

During the 1960s until the 1980s, the Soviet's Cold War program Istrebitel Sputnikov—translated as satellite killer—was a program focused on maneuvers to rendezvous with targets to execute a "kamikaze-style" takedown of U.S. space systems, if and when needed [15].

05. October, '2006-2016 Federal Space Program' was approved, regaining the status of the space sector and leaping to a leading position in global space development. It operates more than 110 satellites(including the former Soviet Union), including reconnaissance, early warning, telecommunications, and navigation. It has established GLONASS, an independent satellite navigation system for the entire planet('11), and succeeded in developing some space weapons such as parasitic satellites and directional energy weapons. Although the key institution of space

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development is Roscosmos(Federal Space Agency), it is the government's active budget support along with cooperation with many agencies including the Ministry of National Defense.

Russian President Vladimir Putin has focused his attention on space, pledging to rebuild greater Russia as a leading country in space development through consistent defense reforms based on his long-term seizure of power[9]. Russia has established and operated Russian Federal Space Agency(Roscosmos) as an institution in charge of space science projects and aerospace research. It is stated that the goals of space strategies pursued by Russia in the 21st century are to maintain the forefront of space development and solidify the status of a powerhouse in space exploration[16].

In June 2012, the Roscosmos space agency announced Russian space activity development strategies until 2030. The "Russian Federal Defense Doctrine" revised in December 2014 stipulated that securing dominance in space is a critical requirement for achieving national defense goals[17].

In 1992, Russia created its Space Force, which was merged with the Russian Air Force on December 1, 2011 and became the Russian Aerospace Defense Forces. On August 1, 2015, it was then merged with the Air Force to create the 'Aerospace Force', fusing space and air defense components into one joint service to manage several related industries. The mission of the Aerospace Force is to protect Russian territory from any violation of its territorial air, respond to all threats from air and space and maintain combat readiness at all times[18].

France, Israel, and Germany are also stepping up efforts to strengthen their defense space.

The focus of this part is on strategy for medium space powers. As with great space powers, the fundamental purpose of any medium space power's space strategy should be to ensure access to and use of celestial lines of communication to support national objectives, whether during peace or conflict. When compared to the strategies of great powers, however, the strategies of medium powers are often different due to a medium power's desire to act independently, while being comparatively more constrained by available material and fiscal resources than most great powers. Discussions about the space strategy for medium powers are possibly more relevant than those of great power strategy because there are more medium powers than great powers. As described in the previous chapter, Deganit Paikowsky categorized medium space powers as those states with the indigenous capability to launch, develop, and control satellites, while being minus any indigenous human spaceflight capability [8].

As mentioned earlier, Korea is a mid-sized country in space today. Therefore, it should be possible to exercise space power accordingly. The aforementioned foreign defense space reinforcement policy provides the following implications for Korea. First, it should recognize the symbolism and complex ripple effects of space development and take an active response rather than sitting on the sidelines in space competition in the 21st century. Space development is based on cutting-edge science and technology, which can serve as a future growth engine for the country. Second, space development implies political and security importance, so it is necessary to prepare for far-right militarization in the future. The space development of China and other neighboring countries could go in the direction of militarization, which is highly likely to be a threat not only to the concerns of the international community but also to the security of Northeast Asia. On the other hand, it is necessary to strengthen Korea's space capacity as well as cooperation for the peaceful use of space. Third, we need to lead cooperation in space development. Space development requires a huge budget and cutting-edge technology, and as a latecomer, Korea will have to focus on international space cooperation. To strengthen its space base, we desperately need to foster "budget," "technology" and "human resources.". To operate based on a new operational environment and insufficient space assets, it is necessary to specify operational plans, manuals, and guidelines, while also making efforts to build infrastructure for information acquisition at various levels. Currently, the National Space Commission of Korea is organized by the Minister of Science and ICT, and the role of the Minister of National Defense in the field of security-related space is very low. The Defense Space Policy of Advanced Countries in Space and its Implications for Korea.

- Forming a legal system by classifying public and private commercial satellites of the government - Operation of the National Space Commission(Chairman: President, Prime Minister)

- Public satellite projects shall be promoted under the responsibility and guidance of integrated civilian agencies, but separate provisions shall be provided for double military satellites under the responsibility and guidance of the Minister of National Defense

Mandatory government approval, Minister of National Defense approval(consultation) to operate commercial satellites for remote exploration and provide acquired satellite information to foreign countries

- Provided to the Minister of National Defense if commercial satellites are military and security-related information

- Granting the Minister of National Defense the authority to use remote exploration capabilities(satellite information, systems, technologies, parts, etc.) of commercial satellites militarily

- When providing remote exploration capabilities(satellite information, systems, technologies, parts, etc.) of commercial satellites to foreign countries, the Ministry of National Defense has the authority to determine the protection and control list Push for the creation of space forces.

## 3. Measures to Strengthen the Defense Space Force

# 3.1. Revision of laws and regulations for strengthening national defense space

The amendment of the Space Development Promotion Act should be made as soon as possible. It is to establish a legal basis for the military to pursue space development on its own. The amendment of the Space Development Promotion Act is as follows. Article 6 is amended to promote the chairman of the National Space Commission to Prime Minister. As seen in the previous study, major countries are in charge of national space development at the prime minister level(U.S., Japan, In) or science and technology-related ministries(U.S., Japan, In), but the military sector is designated by the Minister of National Defense-led development as a special law (F), or the National Space Commission under the Cabinet. The revision of Article 6 will allow the South Korean military to come up with supplementary measures to enable its space development like major countries. In addition, in the case of national defense, the secretary of the National Space Commission should be appointed by the Ministry of National Defense. Because the secretary plays an important role in setting the direction of the meeting. In addition, as an exception to Article 11 that a space projectile can be launched only with the permission of the Minister of Science and ICT, it reflects the fact that "the Minister of National Defense instructs and notifies the Minister of Science and ICT.". Article 21 states that the military should consult with the Minister of Science and ICT in space development, which should be revised so that it can be dualized into space development led by the Minister of Science and ICT and development led by the Minister of National Defense. In particular, in the case of national defense, a separate working committee under the National Space Commission is established to protect military secrets separately from the private sector.

In the direction of the legislation

- The first option is to enact a law to strengthen the defense space force(special law).

- The second plan is to revise the current 'Space Development Promotion Act', add and strengthen security-related clauses.

It is to upgrade to the President(Prime Minister) of the National Space Commission.

The chairman of the National Space Commission will be upgraded to the president(Prime Minister) to strengthen defense space capabilities and secure expertise, private space development will be promoted under the leadership of the Minister of Science and Technology, and the development and operation of security-related satellites will be revised to be led by the Minister of National Defense.
Security-related space development is regulated and applied to the Defense Acquisition Program Act led by the Secretary of Defense(Partial Amendment of the Defense Acquisition Program Act).

It is amended to be led by the Minister of National Defense on the contents related to security(development and operation of military satellites, utilization of satellite information, and provision abroad).

I am obliged to provide the Secretary of Defense with information obtained from private satellites.

Concerning the international registration of satellites for military purposes, the Minister of National Defense shall provide the Minister of Foreign Affairs with the registration thereof.

It is to revise the Armed Forces Organization Act, the Ministry of National Defense, the Joint Chiefs of Staff, and the Military Direct Decree for the basis of space-related organizations.

The National Assembly Legislation of the Space Development Promotion Act 12, which includes the above-mentioned proposals, was enacted at the end of 2020 and was approved at the general meeting of the Science, Technology, Information, Broadcasting, and Communications Committee in June 2021 and is scheduled to be reviewed by the Legislation and Judiciary Committee. Subsequent legislative procedures, including the plenary session, need to be carried out smoothly.

Second, it is necessary to actively reflect and specify the defense space development plan when establishing the next basic plan for space development promotion. The basic plan is designed to set mid-to-long-term visions and goals and to systematically promote space development and enhance efficiency. The 3rd Basic Plan for Space Development will be launched in 2018.

The Basic Development Plan('19~'33) was revised in 2019. In line with the timing of the revision, it is necessary to increase the linkage between the two basic plans, reduce redundancy, and the adjustment process needs to be implemented more systematically.

#### **3.2.** Korea's defense space strategy development direction

Strategic requirements

1) Strengthen cooperation with advanced countries including the United States for space security

International space cooperation is essential because space security is a global challenge. Based on the Korea-U.S. cooperation system, space cooperation will be expanded to strengthen the combined space operation capability and develop the Korea-U.S. space practice and training system. Strengthen exchanges and cooperation in the defense space sector with advanced countries outside the United States.

2) Response to space threats and risks in space and securing space

It secures space superiority that can respond to increasing space threats and space risks and ensure stable space activities of the nation and the military. It effectively responds to North Korea and potential space threats by utilizing tangible and intangible military forces, including military space forces, and the capabilities of allies. North Korea's space threat activities should be monitored at all times and its ability to suppress and respond by projecting military power if necessary. It is necessary to gradually establish a system that can respond flexibly to potential space threats.

3) Efficient support for military warfare in the ground, sea, and air areas

It supports joint military operations by connecting, expanding, and integrating all areas through space to curb and effectively respond to potential threats from North Korea and neighboring countries. The ability to quickly detect North Korea's threats and support command decisions and precise strikes on time, and the ability to support joint military operations against

all-around threats should be expanded.

4) The need for national space power development

Advanced space technology developed in connection with the National Space Development Plan shall be applied to the defense space field and actively participate in space development. It will establish a space system that can be used for both civil and military purposes, and establish an environment in which the military can utilize private space assets.

5) Effectively responding to space threats and space risks

Potential adversaries are pushing to build a defense space force by utilizing rapidly developing private space technology, and the space threat in terms of security is increasing as major countries strengthen their defense space capabilities.

It should be able to prepare for various space threats, such as GPS radio disturbances and satellite communication disturbances, by strengthening independent defense space forces and expanding space cooperation between countries. An effective countermeasure shall be prepared by analyzing the impact of North Korea's military space capability on the utilization of our space system. A space threat response system shall be established to preemptively identify and effectively suppress space threats by utilizing national space zone recognition capabilities and international space cooperation systems. It develops detailed response procedures by expanding space threat preparedness drills involving all space-related agencies at the national level. Thus, institutional devices such as cooperation channels that can improve credibility and prevent accidental clashes shall be supplemented. It will expand its space capabilities focused on non-physical means to monitor and strategically respond to space threats in neighboring countries.

Despite our deterrent efforts, if neighboring countries cause disputes or threats in the space area, we respond promptly by projecting a tangible and intangible military force and actively prevent additional space threats from occurring. By utilizing national space assets and international cooperation systems in an integrated manner, it shall be equipped with forecasting and warning capabilities to detect and analyze space weather in real-time and disseminate it to the entire military. In addition, each discharge should apply space weather information to the operation of satellite systems and electronic and telecommunications equipment to prepare for restrictions on military operations due to worsening space weather conditions.

6) Support for effective joint military operations

Strengthen AI-based command control system capability for efficient command control of space operations to support joint military operations. Human Central Intelligence(HAI) can be used to support the commander's decision. It also strengthens the link between space operations and existing military operations.

7) Establishment of an organic cooperation system between the public, private, and military for the development of space power at the national level

Civilian-military cooperation shall be actively promoted for the efficient construction of defense space with limited national and defense resources. This creates infrastructure for the military use of national and private space assets.

#### 3.3. Strengthening civil-military space cooperation

War is a matter not so much of arms as of money[19]. As Thucydides' quote above illustrates, commerce, trade, and business have been inextricably linked with strategy for millennia. This linkage is because the economic instrument of national power will affect the available means used in conflict, along with potentially shaping the political ends sought. Economies help fund the weapons of war, and the desire for greater economic power can be viewed as a national

interest that needs to be protected and advanced. Based upon historical experience thus far, it is expected that economic and commercial activities in space will grow. This will make spaceenabled business, commerce, and trade a national and global interest that should be protected. Highlighting this point, the 2017 U.S. National Security Strategy states, "As the U.S. Government partners with U.S. commercial space capabilities to improve the resilience of our space architecture, we will also consider extending national security protections to our private sector partners as needed"[20]. As such, the United States places great importance on civilian-military cooperation in space. Therefore, civilian-military cooperation is essential for space security in Korea. It is mandatory for the Ministry of Science and ICT must make a preliminary judgment on the usability of the civilian and military when developing the space system so that the cooperation between the civilian and military can be fully utilized. As in the case of major countries, the most effective strategy in space power and space technology development will be civil-military cooperation. The South Korean military is also actively participating in the multi-ministerial projects being organized by the Ministry of Science and ICT in the fields of Korean-style satellite navigation systems, reconnaissance satellites, and projectiles. It is expected to minimize resource redundancy and create synergy in the development of space systems that can cost astronomical costs. The emergence of the new space era opened the era of private-led space development in the Cold War state-led space competition. The New Space refers to a change in the ecosystem of the space industry as the existing national and conglomerate-centered space development is moved to private and small businesses due to the dramatic expansion of the commercialization of space and private participation in space development [21]. In other words, it means new business models based on being able to shorten the product development cycle and supply space products and services with much less investment compared to the traditional model of the space industry [22]. A regular consultative body with the State and private spacerelated agencies shall be established to expand exchanges and continuously develop a cooperative system. It will identify space technology that can be jointly used by the civilian and the military and actively introduce private space technology while contributing to the development of national space technology by providing military space technology that can be transferred to the private sector. Based on the civilian-military space cooperation system at the national level, militarily usable countries and private space assets shall be identified and a cooperative system shall be established to utilize private assets in case of emergency. It utilizes space surveillance and control systems such as the Korea Aerospace Research Institute, the Korea Astronomy, and Space Science Institute, and strengthens cooperation with space-related agencies within the NIS, Korea Aerospace Research Institute, and the Korea Astronomy and Space Science Institute. In addition, it encourages civilian participation in military-led space threat and risk preparedness training to improve common response capabilities and enhance mutual understanding. The exchange of professional human resources and educational opportunities shall be continuously expanded and the development of civil/commercial space technology shall be utilized for the military to expand national defense space technology. Major technologies of the fourth industrial revolution, such as high-power laser, ultra-small satellite system, and projectile technology, are applied to defense space technology. In particular, a mathematical satellite, a laser for removing space waste/sea debris, and a space flight for extending satellite life.

## 4. Conclusion

In the 1992 Gulf War, the 1999 Kosovo War, and the 2001 Afghan War, the United States used GPS to perform military activities such as troop movement and missile flight tracking and these are main examples of the militarization of outer space. It acknowledges the inevitability of the military use of space for the rapid and effective response for national security purposes [23]. Currently, South Korea is in an arms race between neighboring countries, along with inter-Korean confrontation. Therefore, it is urgent to strengthen Korea's defense space. It is also urgent

to strengthen its defense and space capabilities in South Korea in light of North Korea's nuclear and missile development and the strengthening of the world's space development and space capabilities. However, the 425 projects, which will be the first step toward strengthening defense space power, have been delayed, and related laws are also very insufficient. Some Korean societies tend to set or voice negative opinions on investment and efforts in the high-tech weapons sector, such as strengthening defense and space capabilities, making it a serious concern for national security. However, special systems and norms should be established on security-related issues that should guarantee the lives and safety of the people, and in particular, although it is the easiest way to enact a special law under the request of the times to strengthen defense space capabilities and the Korean national security situation, criticism has been raised over the lack of consultations between related agencies and concerns over the militarization of the international community.

Therefore, while first pushing for the enactment of a special law through the legislation of lawmakers, it will be appropriate to insert and revise provisions related to defense space in the current laws(such as the Space Development Promotion Act, the Defense Business Act, the Armed Forces Organization Act, the Aerospace Industry Promotion Act, etc.) at the same time. In particular, it is necessary to give the defense minister full authority on issues related to defense space, and on the other hand, it is reasonable to carry out legislative activities in a way that does not go against the cause of "peaceful use" of the international community. In addition, efforts should be made to expand systems and organizations to strengthen the defense space and train experts.

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# 6. Appendix

#### 6.1. Authors contribution

	Initial name	Contribution
Author	нс	-Set of concepts 🔽
		-Design 🔽
		-Getting results 🔽
		-Analysis 🗹
		-Make a significant contribution to collection $\ oxtimes$
		-Final approval of the paper 🛛
		-Corresponding 🗹
		-Play a decisive role in modification 🔽
		-Significant contributions to concepts, designs,
		practices, analysis and interpretation of data $\ oxdot$
		-Participants in Drafting and Revising Papers 🛛
		-Someone who can explain all aspects of the paper $\ igsidentum{arphi}$

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