No. 558 MAY 15, 2026

The Argus

Since 1954

Labor Economics Behind South Korea's "Just Resting" Youth Phenomenon

Structural Barriers Blocking Youth's Return to the Labor Market

When One Withdraws, Society Pays the Price

From Burnout to Isolation: The Psychological Toll of Withdrawal

Toward a Society Where Rest Is Not Failure

Hankuk University of Foreign Studies

The Argus

ESTABLISHED 1954

Published monthly except on school holidays by and for the students of Hankuk University of Foreign Studies, The Argus, the campus English magazine, pursues the highest standard of campus journalism and academism.

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Printed by HONG DESIGN | Tel: 464-5167 Fax: 464-5168

Editorial

The Root of Things

All phenomena are shaped by causality. What we encounter in the present is not independent, but results from causes and processes over time. For this reason, understanding a phenomenon requires more than observing its outcome. It requires examining the causes that produced it and the sequence of its development. Only by understanding these causes can we trace how they unfold into a process and lead to the observed result. In this way, causality reveals the process by which a phenomenon takes shape.

This May issue examines how understanding this flow allows for more accurate interpretation, appropriate responses, and a clearer sense of how to proceed. In today's society, individuals are often judged based on their current state. Yet such states do not emerge independently. They are formed through the accumulation of social expectations, economic conditions, and structural circumstances that shape how people arrive at their current state. Recognizing these causes allows such conditions to be understood without reduction to simplified judgments and provides a basis for developing responses that address how they are produced.

Similar patterns can be observed in social issues. Problems that appear in society do not arise from isolated incidents but are shaped by institutional conditions and structural environments. Identifying these causes allows such issues to be approached not at the level of their appearance, but at the level of their formation. In this sense, understanding institutional causes becomes the starting point for more effective approaches to social problems. Natural phenomena can also be understood in this way. What appears as a visible event is the result of processes operating under consistent principles, and understanding these principles clarifies how such events occur and how their effects can be interpreted. The same applies to technological development. Technologies that appear as advanced outcomes are built upon underlying concepts and mechanisms, and understanding these principles provides a basis for anticipating how such systems may develop in the future.

Ultimately, understanding begins not with the visible result alone, but with the path leading to it. A phenomenon becomes clearer when understood as the outcome of connected causes and processes rather than as a fixed state. Whether in society, social systems, nature, or technology, tracing this flow allows for a more precise understanding of the present and a more deliberate approach to what follows. In this sense, understanding causality is not an additional step in analysis, but a condition for understanding.

By Lee Seeun
Editor-in-Chief
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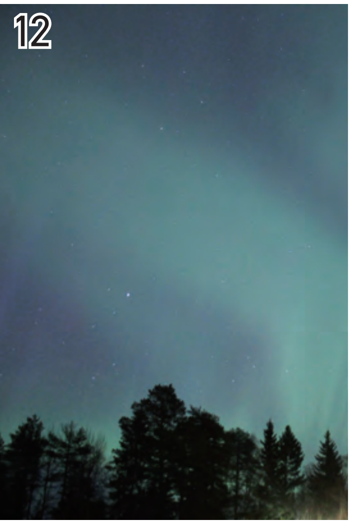

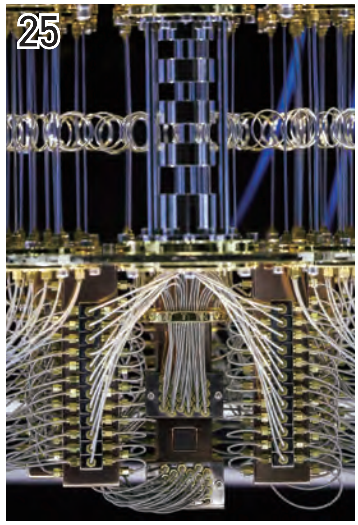

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Cover Story

>> In 2026, South Korea (hereafter Korea) renamed Workers' Day to Labor Day — a shift reflecting a deeper question: who gets to define the value of work, and on whose terms? Yet as the nation debates labor autonomy, some young Koreans have quietly chosen to exit the workforce altogether, neither employed nor seeking work. Society has largely dismissed them as unmotivated, but the reality can be far more structural. This article examines the labor-economic and psychological causes driving youth labor market withdrawal, traces how social stigma deepens isolation and multiplies costs, and asks whether Korea's compressed-growth culture — one that equated rest with failure — is itself part of the problem. Drawing on Sen's theory of freedom, let's explore what conditions must change for young people to genuinely choose to return.

Sunmyeong Elected as 60th GSC

© instagram @hufs60_sunmyeong

▲ "Sunmyeong" candidates Han Su-yeon (L) and Kim Ha-eun (R) run in the 60th HUFS Student Council election.

On April 10, 2026, the 60th General Student Council (GSC) of HUFS Seoul Campus, "Sunmyeong," was officially elected. The voting took place over two days from April 7 to 8. Kim Ha-eun from LD was elected as president, and Han Su-yeon from Chinese Foreign Affairs and Commerce, as vice president. Following the election, "Sunmyeong" presented its campaign pledges, organized into several categories including academics, finance and governance, welfare, facilities, regional cooperation, communication, branding, and career support.

In academics, the council pledged to improve three major academic systems: grading, course retakes, and credit forfeiture. It also proposed expanding course offerings, increasing opportunities to earn extra credits, and requiring the release of syllabi before course registration. In addition, it promised to strengthen regulations related to grade input deadlines and responses to grade objections, as well as reorganize the basic course system and expand academic rights for students during military service. In the area of finance and governance, the council proposed introducing an academic improvement scholarship, expanding the 7+1 scholarship, and establishing mentoring scholarships through intercollegiate cooperation.

Regarding communication, "Sunmyeong" pledged to expand communication channels, including regular meetings with the university president. For welfare, it proposed expanding partnerships in areas such as legal services, software, certifications, and healthcare, along with improvements to parking and cafeteria services and the installation of sanitary product dispensers in campus buildings. In terms of facilities, the council pledged to create a greener campus environment, expand access to sports spaces, remodel aging buildings, improve dormitory facilities, and extend library operating hours.

Additional pledges are available on Sunmyeong's official Instagram account. Kim Ha-eun, president of GSC said, "Its top priorities are the 'rationalization of academic systems,' aimed at addressing long-standing structural issues that directly affect students' right to learn, and 'QUINQUATRIA Twice a Year,' designed to strengthen HUFS's branding by showcasing campus identity and energy across both semesters. Our goal is to become a student council that delivers tangible change by turning student demands into concrete institutional outcomes through continuous communication with the campus community." As the new GSC begins its term, attention is focused on how these pledges will be implemented in practice.

By Lee Seeun
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Credit Waiver System to Implement


[공통] 학점포기제 시행 안내

학점포기제 시행 안내

©HUFS

▲ HUFS implements a credit waiver system.

Starting from the 2026 Spring Semester, a credit waiver system will be implemented to reduce students' academic burden and improve achievement. Applications for credit waiver are only open to enrolled students in their sixth or seventh semester, and up to six credits for courses with a grade of C+ or lower are eligible for waiver; applications are scheduled for July 2026.

Students enrolled in their first to fifth or eighth semester and above, on leave of absence, awaiting graduation, or graduates are not eligible to apply. Credits cannot be waived for courses required for graduation, such as mandatory general education, major, or teaching requirements, or for courses for which a grade has already been obtained after retaking. Furthermore, credits from external institutions recognized for transfer, including those from a transfer student's previous university transcript, are excluded.

The application period is scheduled for July 2026, after the finalization of grades for the current semester, including the Summer Semester. Once a course is waived, grades will be deleted, and the course cannot be retaken. Nam Woohyun, a senior majoring in political science and diplomacy, said, "I am glad it has finally been introduced. However, I do not quite understand the conditions limiting it to six credits and restricting which grades allow deletion. I wish the university would be a little more considerate of the students."

By Kim Yi-eun
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IEI Holds BOO-rumabul Relay, Season 3

©IEI

▲ HUFS IEI holds BOO-rumabul relay, season 3, continuously until June 27, 2026.

Season 3 of the BOO-rumabul Relay is currently being held to promote the Institute for Educational Innovation (IEI) through student participation programs. Running continuously until June 27, 2026, the game requires participants to create and submit a 60-second video featuring their travel experiences with BOO, the HUFS mascot. Current students, students on leave, and alumni of HUFS are eligible to participate.

To participate, applicants must apply for the HUFSAbility co-curricular program "BOO-rumabul Relay Promotional Video," write a video scenario on the application form, and submit it along with the completed video via email. Selected videos will be uploaded to the IEI's social media channels. Videos must be 60 seconds long with a resolution of 1080p or higher and with a 9:16 aspect ratio. The video must include BOO, a country and city background, the IEI's promotional text, and background music from that country. Recommended elements include visually striking shots, scenes featuring BOO as the protagonist, and sequences filled with attractions. The first 20 participants to submit a video through the BOO-rumabul game will receive a prize of 50,000 won (US$33.37). After the deadline, June 27, the top three most popular videos will be selected through a vote, with the Grand Prize winner receiving 100,000 won (US$66.74) and the two Excellent Prize winners each receiving 50,000 won (US$33.37).

Kang Raehyun, a senior majoring in economics, who is participating in the program, said, "I have always loved traveling, and I decided to join because I thought that making travel reels with Boo would make my trip even more memorable." For those looking for a new way to capture their travels, BOO-rumabul offers a unique opportunity to experience and share the journey.

By Kim Yi-eun
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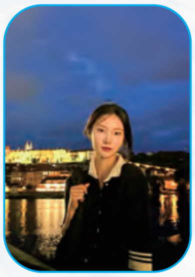
Hello, Summer: HUFSans' Hidden Vacation Spots

By Lee Joon-woo
Cub Reporter

May is a golden month of opportunity for HUFSans. With midterms over and festivals approaching, it is the perfect time to plan summer vacation. May 5 is "Ipha," a traditional solar term that officially marks the beginning of summer in South Korea (hereafter Korea). As a seasonal bridge to hotter days, the season inspires a move away from the library and into the vibrant world outside. To celebrate this transition, The Argus asked fellow students to share their hidden sanctuaries and dream vacation spots; from quiet places of solitude to adventurous locales, discover personal stories and find inspiration for personal summer vacation.



In Han-bi
Department of Public Administration '25

Last summer I went on a group package tour across Europe, and the Czech Republic was my final destination. Unlike the hot and humid summers in Korea, the weather in Czechia was incredibly refreshing and dry, making it a perfect sanctuary from the heat. However, my mistake was choosing a tightly scheduled package tour. I only had a very short time to truly experience the magic of Prague. I felt a deep sense of regret as I watched my final sunset, wishing I had more days to wander freely. However, that lingering regret turned into a beautiful memory when I saw the night view; the golden lights reflecting off the Vltava River were unforgettable. My ultimate tip for HUFSans? If you love beer, you must visit Czechia. Sitting at a riverside pub with a cold, local beer is the best way to embrace the spirit of "Ipha."

Lim Yun-a
Division of Tourism & Wellness '24

Over the years, I have spent most of my summers exploring various beaches and islands, but Jeju Island remains my ultimate recommendation. To be honest, the "Ipha" heat in Jeju can be harsh, and the humidity and scorching sun make it quite challenging even to walk around. When I visited Jeju during the peak of summer, I felt exhausted at first and wondered if I had made a mistake. However, my perspective shifted the moment I doveived into the ocean. Engaging in water sports and swimming in the crystal-clear water was the most refreshing experience of my life. My secret tip for HUFSans? Don't just eat at crowded restaurants. Go to the local market, get some fresh sashimi and red-banded lobster (ttak-saeu), and then head straight to the shore. Eating fresh seafood while feeling the salty sea breeze is pure romance, it blows all the summer fatigue away. Through Jeju Island, I realized that even the most humid days can turn into a cool, lifelong memory if you have the right view and the right food.

Yun Hyo-seop
Business Administration '25

When I was younger, my family took a trip to Damyang during the peak of summer. I remember being so exhausted by the scorching heat that I stubbornly insisted on staying indoors, refusing to take a single step outside. Eventually, my parents persuaded me to visit Juknokwon, Bamboo Garden, just once before going back inside. Surprisingly, the moment I stepped into the dense bamboo forest, the temperature seemed to drop instantly. Walking through the towering green stalks, I felt a natural breeze that no machine could ever replicate. Now Damyang is a place I cherish. For those of you who are tired of the city's heat after midterms, I highly recommend you to indulge in the green shadows of the bamboo. You'll find that the rustling leaves and the cool, earthy scent of the forest can soothe your soul far better than any indoor place.

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Protecting the Frontline: Strengthening Protections for Firefighters in the Field

By Kim Yi-eun
Editorial Consultant

"Respect for life, national safety as the top priority." Firefighting officials, who protect the lives and property of citizens by handling fire suppression, rescue, and emergency medical services in disaster situations, as well as daily safety duties, are commonly referred to as heroes. When a fire breaks out, they head into the flames, risking their lives to search for survivors and locate the source of the fire, without knowing exactly what dangers lie within. However, are firefighting officials receiving treatment and institutional protection worthy of the title "hero?" Those who work with a sense of duty as firefighting officials receive different levels of support depending on the region, and because the compensation procedures for harm and sickness caused by firefighting duties are complex, they often eventually give up or even receive complaints while trying to respond quickly. On the occasion of International Firefighters' Day on May 4, The Argus intends to address the problems and causes of the systems surrounding firefighting officials in South Korea (hereafter Korea) and propose solutions.

Before Reading | Firefighting Officials

Firefighting officials can be categorized into office and field-based positions depending on their work arrangements. Office-based officials have fixed working hours, while field-based officials are responsible for firefighting, rescue, or other emergency services and work in three shifts, even on weekends and public holidays. Their roles are classified into nine categories: firefighting, rescue, driving, fireboat operation, fire helicopter, data processing, communications, administration, and management. Firefighting officials, who were previously divided into national and local positions, were consolidated into a single national status, state public officials (hereafter public officials), on April 1, 2020, to reduce regional disparities in resources and equipment, and to enable rapid, broader responses that transcend jurisdictional boundaries.

1. Public Officials in Name Only

Problem Unresolved Regional Disparities

©The Kyunghyang Shinmun

▲ In 2014, a firefighting official holds a protest at Gwanghwamun Square, demanding the transition of firefighting officials to national status.

"Wealth gap in safety? Equal firefighting services. Make firefighters public officials." In 2014, firefighters dressed in heavy firefighting gear stood at Gwanghwamun Square in Seoul, demanding a transition to national status. In April 1, 2020, this long-awaited move finally took place to resolve regional inequalities in treatment and services and to ensure broad-scale cooperation and efficient responses to disasters. After six years, this goal remains to be achieved, as regional differences in the budget for firefighting officials persist. According to the National Assembly Research Service (NARS) report, *Is the Purpose of the Nationalization of Firefighting Officials Being Achieved?* (2026), there were significant disparities in the support expenses allocated for the treatment of officials by provincial and municipal fire headquarters (hereafter fire headquarters) as of 2025. Ulsan, with the highest per capita clothing allowance at 700,000 won (US$471.22), was 2.8 times higher than Busan and Jeju Island, which had the lowest at 250,000 won (US$168.29). Additionally, the per capita cost for outsourced education in North Chungcheong Province was 428,000 won (US$288.12), which is 10 times that of Busan's 41,000 won (US$27.60), and the cost for health checkups in North Gyeongsang Province was 536,000 won (US$360.82), which is 2.7 times that of Gangwon Province's 200,000 won (US$134.63). Out of the 17 fire headquarters, only 10, including Seoul and Busan, fully cover group insurance.

Regional manpower discrepancies among firefighting officials also persist. As of 2024, the population served per official in Seoul was 1,255, which is more than three times that of the 396 in South Jeolla Province. Although ambulances are required to have a three-person crew, a driver, a patient care provider, and a person responsible for selecting the hospital, the National Fire Agency (NFA)'s *Statistical Yearbook of 119 Emergency Medical Services* (2025) reveals a troubling gap. While the nationwide average for the three-person crew stood at 87.8 percent in 2024, Gyeonggi Province, where each official serves 1,256 people, reached only 51.6 percent, meaning nearly one in two calls was handled by a two-person crew. Such imbalances raise concerns about safety gaps during emergencies between regions. Furthermore, regional differences in the quality of service abound. Ryu Sang-il, a professor of Fire and Disaster Management Administration at Dong-eui University, pointed out, "There is a difference in capacity between firefighting services in metropolitan cities and those in provincial areas. This is a serious problem because it means that, despite paying the same taxes, the degree of damage from the same disaster can vary depending on where one lives." As such, the regional difference is critical to citizen safety, as it creates disparities not only in the treatment of firefighting officials but also in the firefighting service, rescuing, or other emergency services provided.

Cause Dual Structure of Finance and Administration

The reason these incongruences persist is that, while their status was unified under a national position, financial and administrative responsibilities remain divided. According to a report by the NARS (2026), although national government funding increased by approximately 2.6 times in 2021 compared to 2019, the firefighting budget still relies heavily on local government finances. The share of national funding rose from approximately 7 percent in 2019 to 11.5 percent following the transition to national status in 2020, reaching 14.9 percent in 2021, but has declined to 11.14 percent in 2026. In particular, despite being public officials, the personnel costs for firefighting officials working in local governments are largely borne by the local governments themselves. As of 2025, personnel costs allocated to provinces and cities through firefighting safety subsidies* accounted for only 8.6 percent of the total personnel budget. This high dependency on local funds renders the national status transition largely meaningless, as disparities between fire headquarters

* Firefighting Safety Subsidies: 45 percent of the total amount of individual consumption tax imposed on cigarettes

regarding recruitment and treatment remain unresolved. While the transition should have included a full budgetary overhaul, insufficient preliminary work led national funds to fail to cover all resources. Instead, local governments still bear most expenses, leading to differences in financial independence based on each local government's firefighting budget.

Since the proportion of national government funding remains low, the differences in budgets invested by each local government directly translate to regional disparities in the treatment of firefighting officials. Professor Ryu explained the reasons behind insufficient budget allocation and poor conditions for firefighting officials by stating, "Since local government heads are elected, they prefer to spend the budget on populist or benevolent projects that produce visible results. Safety sectors like firefighting do not show immediate results, so there is a reluctance to heavily invest in them." He also noted the "path dependency" in budget allocation, which has not changed significantly even after the nationalization. There may be a tendency to stick to the usual methods and procedures rather than considering better, alternative approaches. Furthermore, the fact that firefighting issues are still defined as local affairs under the Local Autonomy Act, causing administrative reliance on local governments alongside financial issues, also contributes to regional discrepancies. Regarding this lack of clear accountability between the national and local governments and systematic consistency with firefighting-related laws, Park Yunjung, a legislative researcher of the NARS, noted, "The practical authority of the Commissioner of the NFA is insufficient because personnel and command rights are dispersed." Researcher Park added that this structure risks undermining the effectiveness of command at disaster sites.

Solution Redefining the Roles of National and Local Governments

To address financial disparities across regions, the national government must strengthen its fiscal responsibility. Professor Ryu noted, "As long as budget items such as personnel costs are not formulated by the national government, there will be no clear solution within the current system." In order to fundamentally resolve these gaps, the national government must directly manage the firefighting budget, institutionalizing government funding support and securing dedicated funding sources for firefighting. Researcher Park suggested, "It must gradually expand national funding or strengthen the national burden, centering on specific items like personnel costs," emphasizing the need to find ways to secure financial resources, such as imposing levies on fire insurance payouts or establishing a Firefighting Development Fund. Han Jae-myeong, a researcher at the Korea Institute of Local Finance, in the issue paper *Plans to Expand Firefighting Safety Subsidies* (2023), mentioned the cases of the United States and Germany, where levies are imposed on fire insurance payouts, suggesting that the fire insurance consider a plan to include a certain percentage of premiums as a contribution to the firefighting safety subsidies, as they are the major beneficiaries. Furthermore, in the policy forum paper *Fire Service Financial Status and Challenges Following the Conversion of Firefighters to National Civil Servants* (2020), Professor Lee Jeong-hee of the Department of Public Administration at the University of Seoul proposed that, given the need for shared resource utilization following the conversion of firefighting officials to public officials, the firefighting portion of the Regional Resource Facilities Tax should be transferred and operated as a pool. Utilizing surplus funds from the Electric Power Industry Basis Fund, property taxes on high-rise buildings, and a portion of fire insurance premiums was also proposed as a way to secure financial resources.

With firefighting affairs now spanning beyond fire suppression to overall social and natural disasters, Researcher Park emphasized the need to clearly redefine the roles of national and local governments regarding accountability, stating that stated, "The scope of firefighting affairs must be reclassified to fit current reality and reflect the redefined responsibility structure of the state and local government in the Local Autonomy Act." Furthermore, the firefighting organization must move beyond a reactive role in disaster response and make efforts to reinforce the value and necessity of its services. Regarding this, Professor Ryu suggested, "Firefighting must identify daily affairs to be conducted during normal times." While field personnel mainly view emergency activities, such as fire suppression and rescue, as honorable and vital, the perception of the public and policymakers may differ. A structure that mobilizes only when a disaster occurs weakens the presence of the firefighting organization during normal times, which can act as a structural limitation in securing manpower and budgets. To that end, by strengthening routine tasks such as fire patrols and prevention activities, firefighting officials must demonstrate a solid presence within the firefighting domain not only during emergencies but also in daily life.

2. Lack of Effectiveness in the Compensation System for Injuries in Line of Duty

Problem Firefighting Officials Left Unprotected

©Ilgangyeonggi

▲ Inside Uijeongbu Fire Station, a sign reads “FIRST IN LAST OUT.”

“First in, last out.” Firefighting officials, who are the first to enter and last to leave disaster scenes to suppress fires and rescue lives, constantly face inevitable physical and mental risks. Continuous exposure to toxic chemicals at fire scenes and night shift work increases the incidence of gene mutations, colon cancer, and bladder cancer. There is also a high risk of lung disease from inhaling harmful gases or dust. Additionally, witnessing devastating disasters and later reliving the loss of injured or killed victims and colleagues often leads to severe mental trauma. According to the Health Checkup Status of Firefighting Officials, which representative Yong Hye-in of the Basic Income Party received from the NFA in 2023, of the 62,453 firefighting officials who underwent routine health screenings in 2022, 72.7 percent were found to have health issues requiring further observation or signs of disease. Among them, 13.7 percent had health issues due to occupational diseases such as hearing loss or pulmonary tuberculosis. Additionally, according to the survey, “National Firefighting Officials Mental Health,” conducted among 52,812 participants in 2023, 43.9 percent required management or treatment in at least one of four categories: post-traumatic stress disorder (PTSD), depression, sleep disorders, and alcohol misuse. Those needing management for suicide risk accounted for 4.9 percent, while 8.5 percent reported having suicidal thoughts at least once.

While firefighting officials suffering from injuries or illnesses due to their service for public safety deserve proactive state protection, the government’s role in their treatment and compensation remains largely passive. According to a research project, “Policy-Based Group Insurance for Firefighters” (2021), commissioned by the NFA, only 16.5 percent of the 2,183 officials approved for injuries in line of duty compensation reported having no out-of-pocket expenses. Furthermore, 10.2 percent of respondents reported paying over 2 million won (US$1,346.35) in personal medical costs. Although the presumption of injuries in line of duty was introduced in 2023 to ease the burden of proof and expand the scope of recognized occupational hazards, the application process itself remains a significant practical burden for individuals.

Cause Burden of Proving Injuries in Line of Duty and Concerns over Stigma Within the Organization

Firefighting officials must personally prove the causal relation between their duties and their injuries to have an occupational hazard recognized. In particular, individuals must provide extensive documentation, such as health insurance records, medical benefit history, duty logs, job descriptions, witness statements, doctors’ opinions, and medical histories, such as pre-existing conditions or medications, to prove their illness resulted from their work. According to a NFA research project (2021), 45.9 percent of firefighting officials reported that they did not apply for compensation for injuries in line of duty approval despite sustaining work-related injuries. They cited potential disadvantages in personnel evaluations or the complexity of the application process as the primary reasons. In fact, 41 out of 122 claims filed for medical treatment of occupational illnesses, including mental health issues, were rejected, which means one in four applicants failed to have their conditions recognized as occupational illnesses by the state.

Beyond these administrative barriers, the organizational culture also exacerbates the burden of applying for compensation for injuries sustained in the line of duty. Concerns about negative perceptions within the organization when filing a workers’ compensation claim act as a psychological barrier that makes it difficult to file such a claim. Despite mental health support policies offered, like counseling, firefighting officials are reluctant to use them due to a “stigma effect.” Professor Ryu noted, “Due to the nature of the firefighting profession, which is protecting the lives and property of the public, there seems to be a tendency within the organization to view seeking such counseling as a sign of individual weakness." This also applies to applications for injuries in line of duty. Particularly with mental illnesses like PTSD, concerns of being stigmatized as "weak" by colleagues lead many to opt out of applying altogether.

Solution Establishment of a State-Led Support System for Injuries in Line of Duty and Cultivation of a Psychological Support Culture

The primary reason firefighting officials hesitate to apply for compensation for injuries in line of duty despite sustaining on-duty injuries is the burden of filing the claim and proving duty-relatedness. To address this, a dedicated Disaster Compensation Team was established in 2022 to assist with documentation, resulting in faster processing times and increased approval rates. However, excluding dispatched staff, the team consists of only four members within the NFA leaving them understaffed as their per-capita caseload exceeds that of other occupations. In order to reduce this structural burden, the system must shift away from requiring individuals to collect all documents and prove their own claims. Instead, the team should be expanded to create a system where the state proactively supports the verification process from the early stages, utilizing administrative records such as dispatch and health checkup logs. Furthermore, to ensure the practical effectiveness of support for injuries in line of duty, infrastructure must be expanded so injured personnel can receive professional diagnoses and assistance. Regarding mental health support, Professor Ryu noted the difficulty in securing specialists, stating, "It is hard to find professional counselors for those in occupations with severe PTSD levels like firefighting officials." In this regard, the National Fire Hospital, specializing in burn and PTSD treatment, will play a crucial role after it opens in June 2026. Mentioning that the hospital will be located in Jincheon County, North Chungcheong Province, Professor Ryu suggested, "Firefighting specialty hospitals must also be established in metropolitan areas to practically resolve issues like compensation for injuries in line of duty."

©Fire Prevention News

▲ The National Fire Hospital, specializing in treating firefighting officials, is to open in June 2026.

Meanwhile, to normalize the use of claims for injuries in line of duty for mental illness, the organization must first improve negative perceptions that view such conditions as a personal weakness and foster a culture where counseling can be sought without concern of scrutiny. Emphasizing this internal shift in perception, Professor Ryu proposed the "Peer Counselor System" used in the U.S. and Europe as an alternative, explaining "Under this system, firefighting officials receive professional training to counsel their colleagues. And counseling is far more effective when led by peers who understand the realities of the field better anyone else."

3. Liability Burdens Hinder Proactive Firefighting Activities

Problem Lawsuits and Civil Complaints Threatening the "Golden Time"

©Newsis

▲ To secure the golden time, firefighting officials conduct training to remove illegally parked or stopped vehicles that obstruct fire trucks.

Firefighting officials responding to an emergency call are sometimes blocked by illegally parked or stopped vehicles. In fire emergencies, the initial response is critical, as it significantly determines the extent of casualties and property damage. According to a report, *Status of Emergency Vehicle Operations and Measures for Improvement* (2020), by the Samsung Traffic Safety Research Institute, arriving after the 5-minute "golden time" doubles the number of fatalities and triples the property damage compared to arriving within the targeted time. Despite this, National Fire Data System statistics show that in 2025, there were 43 cases nationwide where illegal parking delayed fire truck arrivals. During a fire at a sports center in the city of Jecheon, North Chungcheong Province, in 2017, fire trucks were delayed in reaching the scene due to illegal parking on the access road. This resulted in a failure to contain the fire in its early stages and led to 29 deaths. Similarly, during a fire at an apartment in the city of Gwangju, Gyeonggi Province, in 2024, it took over seven minutes after arrival just to enter the complex due to illegally parked cars on the apartment access road. While forced removal training increased from 4,095 sessions in 2022 to 5,346 in 2023, there were only four actual enforcement cases, leading to criticism that these drills are merely for show.

Additionally, firefighting officials are sometimes held liable for property damage incurred during firefighting operations, such as damage to front doors caused by forced entry or damage to stair railings during patient transport. According to the NFA, loss compensation payments have steadily risen from 61 cases of 43.13 million won (US$29,034) in 2022, 104 cases of 86.48 million won (US$58,216.09) in 2023, to 98 cases of 100.58 million won (US$67,707.84) in 2024, with most claims involving damaged doors or locks. On January 11, 2025, a fire broke out at a villa in Gwangju, and firefighting officials who were dispatched forcibly opened the entrance doors of six households that did not respond during a search for victims, out of concern for the possibility of additional casualties. Afterward, the residents demanded compensation equivalent to a total of 8 million won (US$5,385.39) for the entrance doors and locking devices damaged by the forced opening, and Gwangju covered the repair costs after deliberation by the Deliberative Committee on Compensation for Losses. While the compensation system is now guaranteed so that individual firefighting officials no longer pay compensation out of their own pockets for complaints or lawsuits when the property of citizens is lost due to legitimate firefighting activities, there are concerns that the increasing number of such compensation demands may discourage the proactive rescue activities of firefighting officials.

Cause — Ineffective Regulations and the Burden of Post-Incident Liability

Although legal grounds have been established for forced removal or property damage regarding illegal parking and stopping that obstructs passage during the dispatch and response process, officials remain hesitant to exercise these powers. This is due to a structure where they must worry about the legal risks that will occur afterward more than the "golden time." Even after forced removal was legally permitted in June 2018, complicated procedures had to be followed at the scene, such as requesting the movement of parked or stopped vehicles, explaining the forced removal if movement was impossible, and receiving the fire chief's order for forced removal. Since then, following the amendment of the General Act on Public Administration in January 2024, post-notification after forced removal has become possible. However, despite the establishment of the basis regulations for forced removal like this, cases where forced removal is actually executed at the scene are very rare.

According to the results of a survey conducted by the National Fire Research Institute in 2020 on 10,459 field firefighting officials, 91.6 percent responded that the forced removal system is necessary, but 74.5 percent of respondents replied that applying forced removal in the field is not working well. Regarding the reason, 42.5 percent cited "administrative and procedural burdens in the post-processing process," and 20.4 percent of the responses expressed concern about disadvantages to the personal status of the person performing the forced removal. Aside from the fact that they may eventually be exonerated from liability, firefighting officials primarily face the burden of civil and criminal lawsuits during the post-processing process. Individual firefighting officials must personally prove the fact that the forced removal was legitimate to respond to lawsuits. In addition, Professor Ryu explained, "The state is supposed to bear the final liability for compensation, but this applies only when a claim is successfully won, and the legitimacy of the disposition is recognized." If they lose the case, it means the legitimacy of the forced removal was not recognized, so the individual firefighting official must shoulder the liability for compensation. Since the practical constraints are significant for field firefighting officials to actively exercise compulsory power while taking such risks, a proactive response may be discouraged.

Solution — Limiting Liability for Firefighting Officials and Enhancing Public Awareness

Forced removal, forced entry, and property damage occurring during firefighting activities are intended to reduce casualties and response time to disaster situations. Therefore, the state should bear the reasonability during the entire process of liability for compensation. However, in reality, while the state

©Fire Prevention News

▲ Firefighting officials undergo forced entry training to break through front doors.

bears the final liability for compensation, individual firefighting officials must primarily bear the burden of complaints or lawsuits. Consequently, individuals are directly exposed to the possibility of compensation, which can eventually lead to side effects such as passive responses during firefighting activities. The report by NARS, *Limitations of the Compulsory Disposition System for Illegally Parked and Stopped Vehicles during Fire Extinguishment by the Fire Trucks* (2024), explained that lawsuits arising from the performance of duties by firefighting officials should be supported. To deal with lawsuits arising during the performance of duties by public officials, public official liability insurance and comprehensive administrative compensation unions are in operation. However, the scope of legal liability coverage for lawsuits arising from forced removal remains unclear, and policies must be reviewed to explicitly designate such cases as covered. Assistant Professor Kim Jeong-hoon of the Department of Fire and Disaster Prevention at Woosuk University, in the paper "Research on National Liability for Compensation in Firefighting Activities" (2024), proposed the establishment of a specialized legal support team as a way to maximize the guarantee of discretionary acts in various legal disputes that may occur during the performance of duties by firefighting officials and to support victims. This is intended to minimize legal disputes by providing not only litigation aid for civil and criminal legal disputes resulting from the performance of duties, but also parallel legal interpretations related to the work of frontline fire stations.

In addition, Professor Ryu explained that "If the organization bears full responsibility for proving cases and proceeds with litigation, placing the entire burden on the organization and ensuring that fire officials are not held accountable but instead carry out mandatory actions strictly according to the manual, problems such as hesitation in enforcing actions and resulting delays in response times would be resolved." This means that plans to limit the individual liability of firefighting officials for compensation should be reviewed to ensure the performance of proactive firefighting activities. In addition to these legal issues, before firefighting officials have to choose whether to carry out forced removal or to detour, the problem of illegal parking and stopping that obstructs passage must be eradicated. As of 2025, the number of parking and stopping enforcement notifications through Whistle, a mobility app that provides prior notice before enforcement against illegally parked and stopped vehicles to guide them to move, reached 7,608,576 cases. Public awareness campaigns are also needed to convey that a vehicle parked or stopped briefly can cost someone their life by obstructing emergency response.

"46," "47." This is slang among firefighters; 46, the question, means "Do you copy?" and 47, the response, means "Copy that." These are their codes as they fight life-and-death battles. The era of taking a firefighting officials' dedication for granted under the guise of "duty" must come to an end. The state must not neglect regional disparities, nor leave injured heroes to prove their suffering on their own, nor allow active rescue personnel to bear the burden of dealing with public complaints. A clear legal framework and systematic support must be provided to ensure that their life-saving missions are not hindered by fear of personal liability. Furthermore, firefighting officials, who may be the last hope to someone in a life-threatening emergency, must be actively supported so that they do not suffer from physical or mental health consequences. Protecting the firefighting officials is, in turn, protecting the lives and safety of the people. To ensure that every call of "46" is met with a safe return of "47," the state must now build solid institutional safeguards that honor their sacrifice.

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Behind Every Aurora Curtain, a Warning Goes Unheard

By Cho Subin
Editor of Theory & Critique Section

In the night sky, where all sunlight has vanished, green and purple lights shimmer once again. The ancient Romans named this phenomenon after Aurora, the goddess of the dawn. Drawn by the aurora's mysterious glow – often called a "curtain of light" – and its rarity as a primarily polar phenomenon, two million tourists visit Iceland annually.

The aurora, however, is not merely a beautiful spectacle. The solar wind responsible for producing it poses measurable threats to modern infrastructure. Although the aurora season in polar regions ends in May with the midnight sun, solar wind activity continues to affect modern technological systems throughout the year. Against this backdrop, The Argus examines the principles of auroral formation, the threats posed by solar wind activity to modern infrastructure, and the current state of research.

The Causes of Auroral Formation: The Curtain Rises

From the Sun to Space

An aurora forms when particles emitted from the Sun collide with Earth's atmosphere to produce light. These particles travel via the solar wind – a continuous stream emitted from the corona, the outermost layer of the Sun's atmosphere, which originates from a plasma-based stellar body. In a gaseous state, neutral atoms consist of a positive nucleus and negative electrons. When intense heat is applied continuously, electrons absorb energy and are ejected from the atoms – a process known as ionization. A gas subjected to sustained ionization transitions into plasma, the fourth state of matter.

The Sun is composed of gases, approximately 74 percent hydrogen, 25 percent helium and 1 percent oxygen, with a core temperature of about 15 million °C. This heat and pressure drive nuclear fusion reactions,* releasing energy that raises coronal temperatures to approximately one million °C. When plasma particles gain enough energy to overcome solar gravity, they are ejected through coronal holes – low-density regions within the corona – and travel outward as the solar wind, eventually colliding with atmospheric gases to produce auroras.

Beyond the constant solar wind, large-scale explosions on the

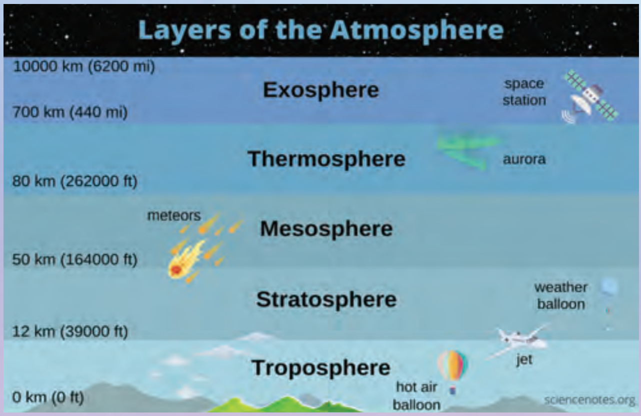
Sun's surface can produce particularly vivid auroras. These phenomena – known as a coronal mass ejections (CME), or solar storms – originate from sunspots. Since the Sun is fluid rather than solid, its rotational speed varies by latitude while plasma circulates via convection. These dynamics twist magnetic field lines, and the regions where these lines break through the surface are called sunspots which are cooler than the surrounding area but more magnetically active. When the field lines above a sunspot become sufficiently distorted, magnetic energy is released explosively, propelling plasma into space. During solar maximum, sunspot activity surges, producing CMEs with faster and denser plasma than the solar wind. As a result, auroras appear more frequently and with greater intensity during this period.

*Nuclear Fusion Reactions: It is a nuclear reaction in which two light atomic nuclei – typically hydrogen isotopes – combine to form a heavier nucleus, releasing a large amount of energy in the process.

From Space to Earth

The Sun emits charged particles – protons and electrons – into space via the solar wind and CMEs. Upon reaching Earth, these particles encounter the magnetosphere – the region where Earth's magnetic field controls the motion of charged particles. The field exerts the Lorentz force* on incoming charged particles, deflecting most of them and preventing them from penetrating Earth directly. However, some particles are guided toward the polar regions along magnetic field lines – imaginary lines representing the field's direction. Since these lines descend vertically toward Earth's surface in the polar regions, the poles serve as the primary entry points through which solar particles can reach the atmosphere.

Particles entering the atmosphere through the polar regions first pass through the exosphere, the outermost atmospheric layer, where density is too low for collisions to occur. Descending further, they reach the thermosphere – between 80 and 600 kilometers altitude, directly beneath the exosphere – where they encounter oxygen and nitrogen atoms at sufficient density to collide. Atoms absorbing this energy emit it as light, producing the aurora. Most particles deposit their energy here and do not penetrate lower atmospheric layers.



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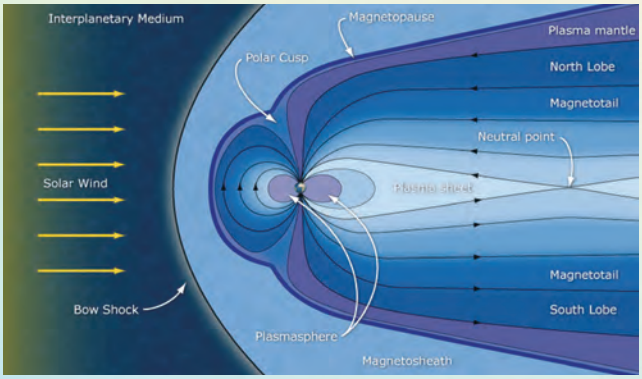
▲ Earth's atmosphere is divided into five layers based on how temperature changes with altitude.

The solar wind and CMEs differ considerably in the scale and intensity of the auroras they produce. The solar wind travels at approximately 400 km/s, taking roughly four days to reach Earth and generating faint auroras confined to the polar regions. CMEs, by contrast, travel at speeds ranging from 250 to nearly 3,000 km/s, arriving in as little as 15 to 18 hours or as many as several days, triggering stronger geomagnetic storms and far more intense and widespread auroras. A geomagnetic storm occurs when the strength and direction of Earth's magnetic field fluctuate suddenly. When solar particles compress the sunward side of the magnetic field, the opposite side is stretched into an elongated structure known as the magnetotail.



©The European Space Agency (ESA)

▲ The solar wind compresses Earth's magnetosphere on the sunward side and stretches it into a long magnetotail on the opposite side.

When the energy accumulated in the magnetotail exceeds a critical threshold, it is released explosively, triggering a geomagnetic storm. Under these conditions, the points where magnetic field lines descend expand beyond the polar regions to lower latitudes, shifting the auroral zone – normally a ring-shaped band between 60 and 75 degrees latitude – southward and allowing auroras to form below 60 degrees. As a result, auroras become visible across a much wider area, including South Korea (hereafter Korea) and central Europe. In May 2024, auroras were observed in Hwacheon, Gangwon Province – about 100 km northeast of Seoul – during the strongest solar storm in 21 years.

*Lorentz Force: It is the force exerted on a charged particle moving through a magnetic field, which causes the particle to curve rather than travel in a straight line.

Why the Colors and Shapes of the Aurora Vary

Auroral color depends on the altitude and atmospheric composition at which solar wind particles collide. At altitudes of 150 km or higher, oxygen atoms predominate. Upon collision, their electrons gain kinetic energy and shift to higher orbits, entering an unstable excited state. As they return to a stable, low-energy level, they emit energy equivalent to the difference between the two levels, producing red light. This emission process takes approximately 110 seconds, which is feasible in the upper atmosphere where lower gravity and atmospheric density reduce the risk of interrupting collisions. At lower altitudes, however, higher atmospheric density causes electrons to lose energy through frequent collisions before red emission can occur.

When particles penetrate to altitudes between 90 and 150 km, they collide with oxygen atoms, exciting them to lower energy states than at higher altitudes. Here, oxygen releases energy in just 0.7 seconds, producing the aurora's signature green light. This rapid emission reduces the risk of interrupting collisions, making green the most frequently observed auroral color. Below 100 km, nitrogen molecules emit light that often appears purple or pink to the naked eye, producing the pink borders visible at the lower edges of intense auroral bands.

Auroral shape varies with solar wind intensity and magnetic field structure. Researchers classify auroras into two types based on how particles enter the atmosphere: discrete auroras, which have distinct boundaries, and diffuse auroras, which spread widely without clear edges. Discrete auroras form when high-energy electrons concentrate along narrow magnetic paths. Weak solar winds produce a quiet, straight band with a distinct lower boundary; as energy increases, the band undulates into curtains and eventually into swirls or spirals. Diffuse auroras, by contrast, spread like fog because particles do not concentrate along specific paths, though increased energy or magnetic field changes can cause their edges to undulate or form omega-shaped curves.

The observer's location also affects auroral appearance. An observer directly beneath the aurora sees a corona radiating outward from overhead; one at a distance sees a curtain or band stretching across the horizon. During a geomagnetic storm, energy accumulating in the magnetotail can trigger a substorm, releasing energy explosively every few hours and pouring additional particles into the atmosphere. Substorm auroras progress through three stages: a growth phase of roughly one hour of band-shaped auroras; an expansion phase of about thirty minutes in which bands fluctuate into swirls and spirals; and a recovery phase of one to three hours in which energy subsides and the aurora flickers irregularly. Discrete auroras are more vivid during the growth and expansion phases, while diffuse auroras tend to spread widely during the recovery phase.

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▲ Diffuse aurora (L) spreads softly across the sky and corona aurora (R) is a more intense form of discrete aurora.

The Adverse Effects Indicated by Auroras: The Warning No One Hears

Space and Aviation Sectors

Auroras are not merely beautiful. The space weather events that produce them can also cause harm in various fields. CME emissions damage satellites through two pathways: direct collisions of high-energy particles and increased atmospheric drag due to thermospheric expansion. In the first pathway, high-energy protons and electrons strike the satellite's solar panels and internal electronic circuits. Solar panels require a crystalline silicon lattice to convert light into current. When high-energy particles displace silicon atoms, the resulting vacancies trap and annihilate electrons before they can move, preventing current from flowing properly. As such defects accumulate through repeated collisions, power generation efficiency declines progressively, shortening the satellite's operational lifespan.

A single high-energy particle can also cause the satellite's internal circuits to malfunction. These circuits distinguish between zero and one based on the presence or absence of charge to process every satellite operation. When a particle passes through the semiconductor substrate, it ejects electrons from silicon atoms – causing zeros to register as ones and ones as zeros – disrupting signals and triggering malfunctions.

The second mechanism involves increased atmospheric drag caused by thermospheric expansion. The energy deposited by colliding CME particles heats the thermosphere, causing it to expand upward. This pushes atmospheric particles into altitudes where the atmosphere is normally sparse, meaning low-Earth orbit satellites suddenly encounter far more particles than usual and experience significantly stronger drag as a result. As drag increases, orbital altitude drops, forcing satellites to activate thrusters and consume fuel. If a storm is intense or prolonged, fuel alone cannot sustain the orbit and the satellite drifts off course.

Among these mechanisms, atmospheric drag has produced the most extensively documented damage in recent years. During the Gannon storm of May 2024, thermospheric temperatures at 160 km, typically around 654°C, exceeded 1,048°C, increasing drag on thousands of satellites. For instance, National Aeronautics and Space Administration (NASA)'s ICESat-2* lost altitude and entered an automatic protective state, while CIRBE* departed its orbit prematurely five months later. Increased radiation exposure also prompted transatlantic flights to reroute southward to avoid communication losses and radiation risks near the North Pole.

*ICESat-2: It is NASA's Ice, Cloud, and Land Elevation Satellite-2, launched in 2018 to measure ice sheet elevation and thickness.

*CIRBE: It is the Colorado Internal Radiation Belt Experiment, a NASA CubeSat launched in 2023 to study Earth's radiation belts.

Communications and Navigation Sectors

Intensifying solar activity increases the frequency of CMEs and solar flares. Solar flares in particular disrupt the ionosphere through the electromagnetic waves – oscillating fields of electric and magnetic energy – they emit, paralyzing communication and navigation systems. The ionosphere is an ionized atmospheric layer at 60 to 1,000 km altitude through which radio signals, including GPS signals, pass to the ground. Like CMEs, solar flares occur when twisted magnetic field lines around sunspots rearrange and release energy, but rather than ejecting plasma, they instantly heat surrounding material to tens of millions of degrees. The heated atoms absorb this energy, become excited, and emit it upon returning to a stable state as electromagnetic waves spanning the full spectrum, from radio waves to gamma rays – reaching Earth about eight minutes after the flare. Among these, X-rays carry enough energy to penetrate the magnetosphere and reach the ionosphere, where they eject electrons from oxygen and nitrogen atoms, causing a sharp spike in electron density. This disrupts GPS, which calculates location by transmitting radio signals from satellites to ground receivers. These signals are refracted through the ionosphere; while this refraction is normally predictable and correctable, a rapid change in electron density prevents accurate correction, causing position errors of up to tens of meters.

In fields requiring centimeter-level accuracy, such as aircraft landing, ship navigation and precision agriculture, this can lead to critical errors. Modern financial systems are equally vulnerable, as they rely on GPS atomic clocks for nanosecond-level timestamp synchronization. In markets processing millions of transactions across multiple exchanges every second, timestamps determine the order of trades and therefore prices. A report titled *Space Weather and Financial Systems: Findings and Outlook* (2014) by Elisabeth Krausmann and four other researchers at the European Commission's Joint Research Centre analyzed how inaccurate timestamps could trigger trading halts or market chaos if GPS services are disrupted by extreme space weather. A 2016 incident illustrated the risk: a software error during a GPS satellite replacement caused a thirteen-microsecond clock error that disrupted communication network synchronization for over twelve hours. Experts estimate a full GPS disruption by a solar storm would be far more severe.

Ground Infrastructure Sector

Geomagnetic storms can also generate geomagnetically induced currents (GICs), currents induced in long conductors on the ground when Earth's magnetic field fluctuates rapidly. As CME particles distort the magnetosphere and vary the magnetic field strength, the magnetic flux through a given area changes, inducing a voltage in conductors at that area's boundaries – such as power lines and gas pipelines – and causing GICs to flow. This phenomenon follows Faraday's law of electromagnetic induction, which also underlies generator operation. When a coil rotates between magnets, the continuously changing magnetic field induces a voltage along the coil. Induced voltage is also proportional to the length of the exposed conductor. Power transmission lines and gas pipelines spanning hundreds to thousands of kilometers are therefore susceptible to large GICs, their length exposing them to field changes across a wide area.

The key component vulnerable to GICs in the power grid is the transformer, a device that steps voltage up or down. To transmit electricity from a power plant to homes hundreds of km away, voltage must be raised to hundreds of thousands of volts – higher voltage requires less current and therefore less heat loss in transmission. Upon reaching homes, it is stepped down to household levels such as 110V, 220V, or 230V. A transformer consists of two coils sharing a common iron core. Current through the primary coil generates a magnetic field that magnetizes the iron core, which induces electricity in the secondary coil. For this to function, the magnetization must alternate evenly between north and south poles in accordance with the alternating current cycle – current that continuously reverses direction. GICs, however, are quasi-direct current (DC) whose direction hardly changes, causing the iron core's magnetization to become biased in one direction – a phenomenon known as DC bias. As DC bias intensifies, the core reaches saturation and can no longer accommodate further magnetic changes, causing the transformer to fail. During the May 2024 geomagnetic storm, GICs of 50 to 62 amperes* were measured in the Karelia-Kola power grid in Russia. Although protective devices prevented a large-scale outage on this occasion, when GICs exceed a transformer's tolerance threshold, the core saturates and overheats; if sustained, permanent failure can occur.

Gas pipelines face a different but equally serious risk. Underground metal pipelines rely on a cathodic protection system that passes current through the pipe to prevent corrosion. When GICs enter the pipeline, they disrupt this protective current and repeatedly disturb the voltage balance between the pipe and the soil, triggering microscopic surface oxidation with each disturbance. Since the late 1970s, abnormal current levels linked to geomagnetic activity have been detected in the Alaska Pipeline; over decades, this accumulation gradually thins the pipe wall.

*Ampere: It is a unit of measurement for electric current.

Future Aurora Research: After the Curtain Falls

Significance of the Research

The appearance of the aurora signals that a geomagnetic storm has already affected human systems. Carol Norberg, a professor of the Department of Physics at Umea University described the aurora as "the end of the line." Consequently, one might ask why we should study the aurora. While the aurora itself cannot serve as a forecasting tool, studying it deepens our understanding of the solar wind and geomagnetic storm mechanisms that drive these impacts. The Quebec blackout of March 13, 1989 illustrates why this research matters: when CME particles reached Earth, GICs flowed through Hydro-Quebec's power lines, transformers overheated, circuit breakers failed, and the entire province lost power for nine hours, leaving approximately six million people without electricity. After examining historical records including radio emissions and magnetic field data from the 1980s, David H. Boteler, research scientist of Natural Resources Canada, finally revealed the mechanism in the paper "A 21st Century View of the March 1989 Magnetic Storm," (2019): the first CME accumulated energy in the magnetotail, and the impact of the second CME triggered the cascade.

Since then, power companies have developed capacitor devices to block GICs in transformers, and PJM – the regional utility coordinating power flows across 13 U.S. states – now receives real-time space weather forecasts from the National Oceanic and Atmospheric Administration to stabilize the grid ahead of strong storms. As Professor Norberg noted, studying historical events like the Quebec blackout allows researchers to determine what happened, even without the ability to predict exactly when such events will occur. The practical goal of aurora research, then, is to improve the accuracy of these predictions to prevent future damage.

Challenges in Research

While researchers have elucidated the basic principles of auroral formation, many details remain unclear. Professor Norberg notes that although the broad concepts are understood, the detailed formation processes are only now beginning to come into focus. A central difficulty is that auroras form at altitudes between 90 and 130 km – too high for weather balloons but too low for satellites to maintain stable orbit. Researchers can use sounding rockets to probe this altitude range. They can wait for an aurora to appear and launch a rocket on a parabolic trajectory to pass directly through it. The International Space Station, orbiting at 400 km, can look down on and image the aurora – and occasionally pass through its upper reaches – although direct measurement is not normally possible.

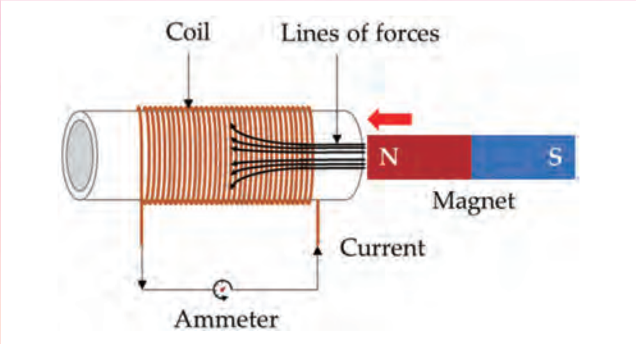
The second challenge is that solar activity increasingly deviates from model predictions. According to the paper by Jamie M. Jasinski, researcher of NASA's Jet Propulsion Laboratory and Marco Velli, a professor of the Department of Earth, Planetary and Space Science at the University of California, titled "The Sun Reversed Its Decades-long Weakening Trend in 2008," (2025) solar wind speed has increased by approximately 6 percent, its density by 26 percent, its temperature by 29 percent and the pressure it exerts on

Earth by 34 percent since 2008. Solar activity had been gradually weakening from the 1980s through 2008, but this trend reversed for reasons that remain unknown. As Professor Norberg notes, predicting solar activity is difficult even for experts, and this unpredictability makes understanding the aurora mechanisms that depend on it all the more challenging.

Research Prospect

Despite these challenges, research institutions worldwide – including NASA, the Swedish Institute of Space Physics (IRF) and the Korea Astronomy and Space Science Institute are mobilizing satellites, radars, and ground-based observatories to track the solar wind and auroras in real time. The IRF is conducting research to determine the three-dimensional structure of the aurora by installing cameras at multiple locations. As Professor Norberg explained, "Researchers previously obtained only two-dimensional images, but are now combining photographs taken simultaneously from multiple locations with modeling to reconstruct auroras in three dimensions. Long-term data is also being accumulated by capturing the aurora every minute throughout each night using a rooftop all-sky camera, building a historical record of how auroras evolve across solar cycles."

Efforts are also underway to expand solar observation networks. The ESA plans to launch the Vigil satellite in 2031 to the L5* Lagrange point. Currently, satellites at the L1 point view CMEs head-on, making it difficult to gauge their speed and direction accurately and limiting warnings to approximately 20 minutes before impact. The L5 point offers a side view of the Sun, and capturing images from this angle before a CME is directed toward Earth is expected to significantly extend forecast lead times.



▲ A moving magnet induces electric current in a nearby coil – the same principle by which geomagnetically induced currents form in power grids during solar storms.

Research is also expanding into the effects of solar activity on ecosystems. According to the paper "Solar storms may trigger sperm whale strandings: explanation approaches for multiple strandings in the North Sea in 2016" (2018) by Klaus Heinrich Vanselow and three other researchers at the Kiel University Research and Technology Centre, magnetic field disturbances caused by solar storms affect the migration of large marine organisms. The team analyzed the mass stranding of 29 sperm whales off the North Sea coast in early 2016 and linked it to a powerful solar storm that distorted Earth's magnetic field, causing navigational errors of up to 460 km. Young whales relying on the magnetic field for navigation consequently lost their bearings and became trapped in the shallow waters of the North Sea. This study suggests that space weather research is essential not only for mitigating technological damage but also for preserving ecosystems.

*L5: It is one of five Lagrange points – locations in space where the gravitational forces of the Sun and Earth balance, allowing a smaller object to maintain a stable position.

"Tonight, the solar wind is expected to be strong, so we should be able to see a vivid aurora. Everyone, look forward to tonight!" "Aurora hunters" gaze at the night sky, hoping for higher CME levels and solar wind speeds. However, while the aurora beautifully adorns the night sky, a warning signal sounds behind that curtain. The solar wind and CMEs that create the aurora disrupt power grids, corrode gas pipelines, and damage satellites. While it is possible to enjoy the light, we should also shine a spotlight on the dangers that exist and on those working to prevent them before that light appears.

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Between Leaps Hidden in the Rest

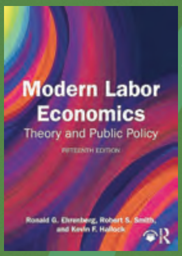
By Cho Subin
Editor of Theory & Critique Section

South Korea (hereafter Korea) officially renamed Workers' Day, or "Geullojaeui Nal," to Labor Day, known as "Nodongjeol," on May 1, 2026. This shift highlights the nuance between two Korean terms: while "geullo" refers to labor performed under an employer's direction, "nodong" emphasizes the autonomy and self-directed nature of work. While workers' agencies receive significant attention, some remain outside the labor market – the so-called "just resting" population, who avoid job-seeking activities. According to Economically Active Population Survey (2026) by the Ministry of Data and Statistics (MoDS), this group accounted for 16.4 percent of the non-economically active population in February 2026, up from 11.3 percent in 2016, with the sharpest increase among youth aged 20 to 34, reaching 22.3 percent of the youth non-economically active population as of 2025. Some dismiss these individuals as unmotivated or lazy. Yet viewing them solely as passive entities may be an oversimplification. The Argus analyzes the causes of this "just resting" youth phenomenon from the perspectives of labor economics and psychology, examining its impact and necessary changes in societal perceptions and policies.

[Before Reading] Just Resting Population

The "just resting" population refers to non-economically active individuals who rest without specific reasons like needing to deal with housework, childcare, or illness, and do not engage in job preparation or educational programs. The non-economically active population includes students, the elderly, and discouraged job seekers, in contrast to the economically active population – the employed and unemployed – who together form the labor force of those aged 15 and older.

Why Do Young People Remain Outside the Labor Market?



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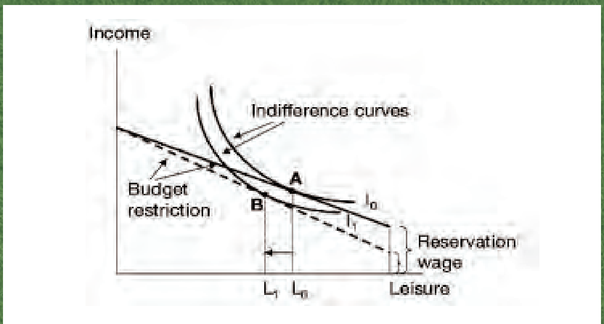
In the book *Modern Labor Economics: Theory and Public Policy* (2017), American economists Ronald G. Ehrenberg and Robert S. Smith examine wage fluctuations and the role of government policy in worker-employer relations. As Korea's "just resting" youth population grows, the book explains why young Koreans are exiting the labor market and the economic losses that follow.

Factors Affecting Labor Supply

Why do young people choose not to work? Labor economics suggests workers choose not to work if they judge resting provides higher utility than working. Various theories examine the factors determining utility, such as the reservation wage theory and labor-leisure choice models. Based on these, labor supply factors fall into two categories: wage factors and information factors.

First, the wage factor determines labor market entry: individuals participate when the prevailing market wage meets or exceeds their reservation wage – the minimum wage they will accept before giving up leisure for work, a trade-off captured by the labor-leisure choice model. Owning financial assets increases non-labor income, raising the subjective value of leisure and elevating the reservation wage. Manager Yun Jin-yeong, Economist Kim Minjeong, and Team Leader Oh Sam-il of the Bank of Korea (BOK), in their report, *Characteristics and Evaluation* of "*Just Resting*" *Youth: A Comparative Analysis by Unemployment Type* (2026), indicate young people with financial assets were 11.2 percentage points more likely to be classified as "just resting" population than those without. Under the reservation wage theory, such youth can afford to reject jobs below their minimum acceptable wage and wait for better conditions – a rational choice unavailable to those without assets.



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▲ The point of tangency between the indifference curve and budget constraint indicates the optimal work-leisure choice.

Second, the information factor refers to the costs workers incur when searching for labor market information. MoDS' 2024 survey indicates that among the reasons "just resting" youth were not seeking employment, the category with the largest increase over the past decade was "lack of education, skills, or experience" – accounting for 21.7 percent of those aged 15 to 24 and 9.0 percent of those aged 25 to 34, up 7.1 and 5.4 percentage points respectively since 2015. Search costs encompass more than monetary expenses – they include the time and psychological strain of writing resumes, preparing for interviews, and enduring repeated rejections. Young people who feel underqualified judge the burden of meeting qualifications too great to begin searching. Unlike the wage factor, the information factor operates at an earlier stage: the search is abandoned altogether, as even a random job offers insufficient returns to justify the effort.

Career adaptability – encompassing career planning, initiative in decision-making, and self-confidence – plays a crucial role in this assessment of search costs. Manager Yun, Economist Kim, and Team Leader Oh indicate young people with low career adaptability were 4.6 percentage points more likely to be inactive than those with high career adaptability. Such youth tend to underestimate their own capabilities, feeling there is little to gain from exploration, while a lack of career direction makes the search process itself feel daunting and exhausting.

Background on the Labor Demand Side

Corporate hiring criteria also influence youth employment levels. Firms hire workers up to the point where the marginal product value of labor (VMPL) equals the wage (W). VMPL is calculated by multiplying the product price (P) by marginal labor productivity (MPL) – the additional output produced by hiring one more worker. Factors affecting VMPL include technological change and product prices, while government regulations influence wages.

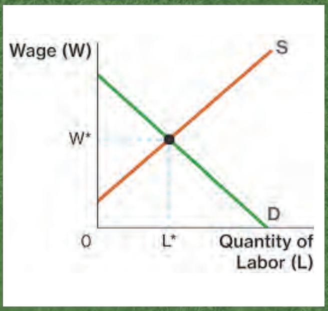
First, technological change affects MPL. When Artificial Intelligence (AI) and similar technologies replace labor, output per worker falls, reducing MPL and dampening labor demand. Economist Han Jin-su and Team Leader Oh Sam-il of the BOK, in their report, *The Spread of AI and the Contraction of Youth Employment: Focusing on Seniority-Biased Technological Change* (2025), note 211,000 youth jobs were lost in the three years following the generative AI tool, ChatGPT's launch – 208,000 in industries with high AI exposure indices, a metric measuring the association between AI and human skills by occupation. Yet technological change does not necessarily reduce overall demand. The capital-skill complementarity hypothesis holds that new technologies raise MPL for complementary skills, with effects varying by occupation – a pattern Economist Han and Team Leader Oh confirmed in industries where AI assists rather than replaces humans. As Gauthier Lanot, a professor at Umea School of Business, Economics and Statistics, noted, "New technologies do not always eliminate jobs. Rather, they transform them," citing roles such as data center operations and robot maintenance.

Second, changes in output prices affect P because labor demand is derived from output demand. According to the law of derived demand, a decline in demand in the product market leads to a corresponding decrease in the number of workers required by firms. When product demand falls due to factors such as an economic downturn, P decreases and VMPL declines. According to Manager Yun, Economist Kim and Team Leader Oh, the number of young people out of work due to involuntary reasons has again been on the rise since 2024. The report speculates this is the result of cyclical factors.

Third, government regulations can affect VMPL by altering W. Regulations such as minimum wage hikes raise W, thereby reducing the employment level at the point where VMPL and W intersect. However, empirical studies suggest different effects may emerge depending on how employers respond to such regulations. Choi Kyungsoo, senior fellow of the Korea Development Institute, in the report *Employment Effect of Minimum Wage Increase* (2018), finds employers typically respond by raising prices, cutting allowances, or reducing hours before cutting staff – suggesting the employment effect varies by employer response.

Labor Market Equilibrium

How do the preferences of workers and firms interact to determine labor market participation? Workers and firms meet at the equilibrium point where labor demand and supply intersect. The supply curve slopes upward – higher wages encourage more participation – while the demand curve slopes downward, as firms hire less as wages rise. The wage and information factors discussed earlier can shift the labor supply curve left, reducing equilibrium employment. Financial assets – as a source of non-labor income – lower willingness to participate at the same wage, shifting the curve left. Rising search costs push it further left, as more "just resting" youth abandon job-seeking altogether.



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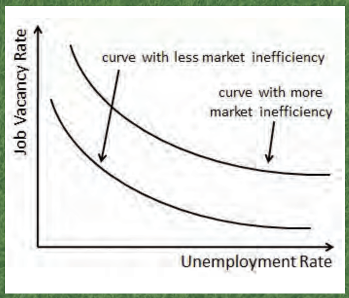
▲ Labor supply (S) and demand (D) intersect to jointly determine the equilibrium wage (W*) and employment level (L*).

Even if the labor market reaches equilibrium with reduced supply, that outcome is not necessarily socially optimal. A "mismatch" occurs when job seekers and vacancies coexist yet fail to align due to differences in occupation, skills, and wages – a structural inefficiency captured by the Beveridge curve. As mismatch deepens, both unemployment and vacancy rates rise simultaneously, shifting the curve away from the origin. Korea's mismatch is worsening: Senior Researcher Min Soon-hong of the Korea Institute for Industrial Economics and Trade, in *Current Status of Labor Market Mismatch and Policy Recommendations* (2025), notes employment losses due to mismatch rose approximately sixfold – from 12,000 in the first half of 2010 to 72,000 in the first half of 2024.



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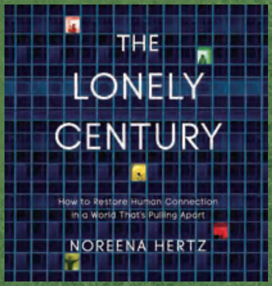
▲ When labor market mismatch deepens, the Beveridge Curve shifts outward, sustaining high job vacancy rates even as unemployment rises.

Yet the problem is not inflated expectations. Manager Yun, Economist Kim, and Team Leader Oh find that "just resting" youth's reservation wage differed by only 1 million won (US$673.44) annually from job-seeking peers, and 48 percent preferred small and medium-sized enterprises – more modest than other unemployed youth – yet still struggled to enter the labor market. Ultimately, amid structural inefficiencies where corporate demands fail to match youth qualifications, some give up and remain "just resting."

Why Some Youth Cannot Return to the Labor Market

Emerita Noreena Hertz, a professor of University College London, in her book *The Lonely Century* (2021), argues that loneliness is not merely a personal feeling but a structural crisis with measurable costs to health, productivity, and democracy – one rooted in decades of policies prioritizing self-interest over community. The book shows how individual withdrawal becomes a collective burden.



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Psychologically Exhausted Young People

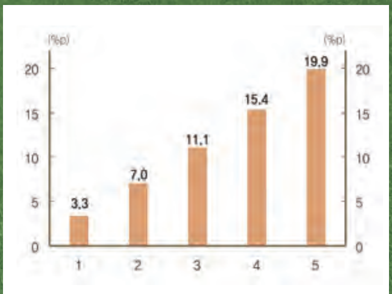
Have these "just resting" youth never set foot in the labor market? Manager Yun, Economist Kim, and Team Leader Oh indicate the probability of a young person with prior work experience becoming inactive was 5.5 percentage points higher than those without. Why do they not return? According to the MoDS' *Economically Active Population Survey* (2024), 20 percent cited recharging, psychological difficulties, and lack of motivation as reasons for not seeking employment. Psychological exhaustion takes many forms. While workplace burnout is common, exhaustion can also stem from job searching itself. The MoDS' *Young Adult Well-being in Korea 2025* (2025) reports 32.2 percent of young people experienced burnout within the past year – career anxiety being the top reason at 39.1 percent, followed by work overload at 18.4 percent. Lee Taerim, a professor of the Department of Education at Korea University, empirically confirmed this in "Validation of the Maslach Burnout Inventory–Job-Seekers Survey" (2022), finding that job-seeking activities share structural and goal-oriented characteristics with workplace tasks, triggering the same burnout mechanisms. Whether in the workplace or job search, repeated frustration and exhaustion can ultimately drive withdrawal from the labor market. As repetitive overtime, poor working conditions, and unstable employment accumulate, depleted young people eventually leave the labor market.

Prolonged withdrawal – whether rooted in economic or psychological factors – invariably produces adverse effects, raising the likelihood of severing social ties and becoming reclusive. Research Fellow Kim Seong-a of the Korea Institute for Health and Social Affairs and Researcher Baek Won-woo of the Federation of Korean Industries, in *Determinants of Youth Reclusion and Estimation of Socioeconomic Costs* (2026), find the reclusion probability among "just resting" youth was 17.8 percent as of 2024 – 6.6 times higher than among employed youth and 2.7 percentage points higher than among those in early unemployment. This underscores the thin line between a temporary break and a permanent state of isolation.

Reclusion here refers to an extreme state of social isolation characterized by severing meaningful relationships and a physical reluctance to leave home. This statistics demonstrates that "just resting" youth represent a deeper psychological state of stagnation than the unemployed: unlike unemployed youth who maintain social contact through job seeking, "just resting" youth have temporarily or permanently abandoned such networks, and as disengagement prolongs, isolation deepens into what may be called "hidden alienation." Such social withdrawal inflicts both mental and physical harm. Professor Hertz explains that deepening isolation leaves individuals feeling disconnected from family, friends, work, and government – a sense of being a "transparent human" in society — and is as harmful as smoking 15 cigarettes a day.

Why the State of Inactivity Persists

Once it begins, the "just resting" state tends to be self-reinforcing. Manager Yun, Economist Kim, and Team Leader Oh report that for every additional year of inactivity, the probability of remaining "just resting" rises by 4 percentage points while the probability of seeking employment falls by 3.1 percentage points – compounding over time, from 3.7 percentage points between years one and two to 4.5 percentage points between years four and five. Professor Lanot noted that "This is identified as state dependence, where past experiences constrain the future." It becomes increasingly difficult to escape this state as time passes. Furthermore, as isolation deepens, the barriers to re-entering society become increasingly higher.



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▲ With years of unemployment on the x-axis and probability change in percentage points on the y-axis, the likelihood of transitioning into the "just resting" state rises sharply.

This prolonged disengagement is particularly harsh on young people, for whom adulthood is precisely the period when social networks are built through work, school, and community — pathways that the "just resting" state blocks entirely. Professor Hertz points out that today's young people are actually the loneliest generation, despite loneliness often being viewed as an issue for the elderly. In Korea, the proportion of isolated and reclusive young people aged 19 to 34 stood at 5.2 percent in 2024, more than doubling in just two years.

Two structural forces – among the many Professor Hertz identifies – accelerate this cycle for "just resting" youth in particular: digital dependency and neoliberal capitalism. Those isolated in the real world turn to screens, and in Korea approximately 96 percent of those aged 18 to 24 use social media – the highest rate of any age group. Shoshana Zuboff, a professor at Harvard Business School, noted that young people, at a time when they should be forming self-identity and moral agency, remain "almost always online" and are exposed to a "psychological tsunami" of social comparison, where features like "likes" and "shares" make social status visible. Failing to elicit a response creates public rejection – what Professor Hertz diagnoses as "a continuous effort to sell oneself, coupled with a constant fear no one will want to buy you" – driving young people further into isolation.

Neoliberal capitalism further intensifies this isolation. As Professor Hertz argues, neoliberalism has reframed social relations in fundamentally competitive terms – making people see themselves as competitors rather than collaborators, and consumers rather than citizens. As the social safety net erodes and civic institutions retreat, the very conditions for belonging disappear. For young people already on the margins, this absence of belonging does not merely feel isolating – it becomes isolation.

From Individual Withdrawal to Social Burden

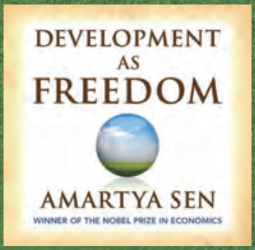
This individual isolation ultimately exacts a broader social cost, manifesting across three domains. First, healthcare and welfare costs create a public burden. Isolation increases the risk of chronic diseases such as hypertension, heart disease and dementia, and exacerbates mental health issues including depression, anxiety and suicidal thoughts. According to the Korean Government's report, *The Social Costs of Youth Isolation* (2023), total annual health costs encompassing illness, premature death and lost productivity, range from a minimum of 29.3 billion won (US$19.73 million) to a maximum of 43.5 billion won (US$29.29 million).

Second, lost productivity generates significant costs. As Professor Hertz documents, lonely workers exhibit low motivation, productivity and efficiency while having high turnover rates; for "just resting" youth who withdraw entirely, these losses are more extreme. Research Fellow Kim and Researcher Baek estimate the annual productivity cost per person at 9.472 million won (US$6,378.85), reflecting lower birth rates, reduced economic participation, and lagging job performance among socially withdrawn youth.

Third, social trust erodes. Professor Hertz warned that isolated individuals, feeling unseen and unheard by both their communities and government, become susceptible to divisive politics and extremism – a threat she describes as a political crisis no less serious than the health and economic costs. The longer "just resting" youth remain disengaged, the more this deficit deepens – a cost that resists easy quantification but is no less real.

Research Fellow Kim and Researcher Baek estimate the total annual cost per "just resting" youth at 9.83 million won (US$6,619.94), comprising productivity losses and policy expenditures under systems such as the National Basic Livelihood Security and Employment Insurance. The increase in "just resting" youth is not merely a labor market statistic – it is a structural signal of accumulating social costs across welfare, the economy, and democracy as a whole.

How Should Society View Those Who Rest Without Working?



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Amartya Kumar Sen, a professor of the Department of Economics at Harvard University, argues in *Development as Freedom* (1999), that true development means expanding people's freedom to live, participate, and choose a life they have reason to value – not merely growing Gross Domestic Product. When "just resting" youth are labeled lazy in a society that equates rest with failure, Is this a failure of individuals, or a failure to provide the conditions in which they can flourish?

Why Korea Stigmatizes Rest

In just half a century, Korea transformed from aid recipient to donor nation – the "Miracle on the Hangang River" built on tireless diligence. As noted in the paper "The Korean Miracle (1962–1980) Revisited: Myths and Realities in Strategy and Development" (1991) by Kim Kwan S., an emeritus professor of Economics at the University of Notre Dame, Korea achieved in decades the industrial restructuring that took today's developed nations nearly a century. Per capita Gross National Product (GNP), which stood at a mere 87 dollars in 1962, rose to 1,481 dollars by 1980 – an increase of approximately 18-fold in just 18 years. This hyper-rapid growth was built on labor-intensive industries and long hours – Korea's annual average working hours of 1,865 ranked sixth longest among 38 Organization for Economic Cooperation and Development nations as of 2024.

Jang Kyung-seop, a professor of the Department of Sociology at Seoul National University, defined this as "compressed modernity" in *The Logic of Compressed Modernity* (2022). Accomplishing national tasks within such a compressed timeframe internalized work and contribution as a "civic duty" transcending mere survival. In this process, labor became a means of proving one's personal worth, while rest, conversely, was viewed as falling behind in the march of growth and as laziness that hindered the community's development. This norm is equally evident in Korea's education fervor. Professor Jang explains it through the "social investment family" – a logic in which families concentrate resources on human capital investment, shaping young people's sense of worth from an early age.

Professor Sen defines human capital as a concept referring to the role of humans in increasing productive potential. While acknowledging that human capital represents significant progress, Professor Sen points out that it is not sufficient on its own. This is because human capabilities extend beyond productivity to include the substantive freedom to lead a life of intrinsic value. Korea's compressed growth was built upon the logic of human capital, and within that framework, humans were treated as means rather than ends of development.

How This Perception Exacerbates the Problem

While these social norms stimulated labor supply and drove rapid growth, they simultaneously produced adverse effects. Becoming "just resting" may be a rational individual choice driven by structural factors, yet from a societal perspective it reduces labor supply and raises social costs. This creates a disconnect between individual and societal optimization. As Korean society attributes this gap to individual failure rather than structural issues, "just resting" youth are stigmatized.

The two types of "just resting" youth mentioned earlier can be categorized using the concept of freedom by Professor Sen. In his work, Professor Sen states that freedom performs two roles. One is the constitutive role, where substantive freedom itself is a core element of a dignified life. It does not include merely the right to choose but the ability to live a life one considers valuable. The other is the instrumental role, where instrumental freedom functions as the external conditions making substantive freedom possible. Professor Sen identifies five types of instrumental freedom: political freedoms allowing individuals to determine and critique governing principles, economic facilities enabling participation in consumption and production, social opportunities providing access to education and healthcare, transparency guarantees ensuring fair disclosure, and protective security safeguarding against extreme deprivation. These five elements are not independent but reinforce each other.

Stigma operates differently for the two types of "just resting" youth. Those who withdrew due to labor-economic factors retain agency freedom – their choices reflect judgments shaped by wage and information factors – yet lack instrumental freedom, as the labor market provided insufficient economic and social opportunities. Moreover, their "just resting" history is interpreted as a negative signal during hiring, structurally blocking re-entry. Agency remains intact, but the external conditions needed to realize it are doubly constrained.

In contrast, young people who withdrew due to burnout and isolation represent instances where the freedom of agency itself has been compromised. For them, even if instrumental freedom is formally available, it is of no use. This is because the phenomenon of "adaptive preferences," as described by Professor Sen, comes into play. Adaptive preferences refer to the phenomenon where individuals exposed to deprivation for an extended period adapt to circumstances by lowering expectations and suppressing desires. As stigma is internalized, the capacity to desire opportunities collapses and substantive freedom erodes. Providing instrumental freedom alone has limited effect.

How Should Policies and Social Perceptions Change?

Policy intervention is necessary because unemployed youth generate social costs. Tomas Sjogren, a professor of Umea

School of Business, Economics and Statistics explains the rationale for policy intervention. He stated, “The economic basis for why unemployment becomes a social problem can be explained by fiscal externalities.” Externalities are unintended effects caused by economic agents. When individuals exit the labor market, tax revenues fall while welfare spending rises – pushing labor participation below the socially optimal level and justifying intervention. Careful design is required, however. The “just resting” state exhibits strong state dependence, making early intervention essential before the condition becomes entrenched. Professor Sjogren emphasized that economic incentives alone are insufficient for those whose withdrawal stems from psychological factors, noting that “especially in a state of burnout, lowering taxes may not be a perfect solution because the act of incentivizing people to work is itself too difficult.” Early intervention is crucial – before stigma is internalized and before burnout deepens into isolation.

Korea has already implemented several policies targeting “just resting” youth. The Youth Challenge Support Project provides counseling, career exploration, and confidence-building for young people with no history of employment, education, or training for at least six months. While researchers Yoo Min-sang and Shin Dong-hoon of the National Youth Policy Institute, in their report *2021 Post-Program Monitoring and Performance Evaluation of Participants in the Youth Challenge Support Project* (2022) found the project improved emotional stability and confidence, satisfaction with post-program follow-up is low, leaving participants to navigate an unstable labor market alone once the policy ends. Viewed through the concept of social opportunities by Professor Sen, this policy partially expand freedom of choice by increasing access to education and training. Furthermore, as this policy aim to restore the foundations of interpersonal relationships and social participation, they align with efforts to expand practical freedom. However, they do not directly address the social stigma contributing to isolation or the inherent instability of the labor market.

Societal perceptions must also shift. Ingrid Bardsdatter Bakke, a professor of the Department of Social Work and Guidance at Inland Norway University of Applied Sciences, in the article “Career and cultural context: collective individualism, egalitarianism, and work-centrality in the career thinking of Norwegian teenagers” (2021), analyzes the perspective on work within Norway’s career education curriculum. Professor Bakke notes that Norway’s egalitarian culture holds no job inherently superior to another, presupposing a social contract in which the state is responsible for creating conditions that allow all citizens to realize their potential. This perspective frames “just resting” youth not as symbols of laziness, but as citizens who withdrew from society due to inadequate structural conditions.

Professor Sen provides the theoretical foundation for this perspective. He argues that freedom is both a means and an end in achieving development goals. In particular, the instrumental freedom he proposes, termed “social opportunities,” includes access to education, healthcare and training. Career counseling, psychological support, and job experience opportunities are not merely welfare benefits – they are, in Professor Sen’s terms, social opportunities that expand the actual capacity to make choices. Providing them is the responsibility of the state. For individuals to take responsibility, they must first possess the freedom to choose.

“I am feeling lazy, so I will be part of the ‘just resting’ population today.” Since the MoDS introduced the category, a culture of mockery has emerged – dismissing any effort without immediate results as “just resting.” The MoEL responded by renaming it “in preparation,” but renaming is not enough. Rest is not the problem; the tendency to view it as failure is. This stigma hinders growth and incurs enormous costs. Society must recognize rest as renewal and build conditions for reintegration.

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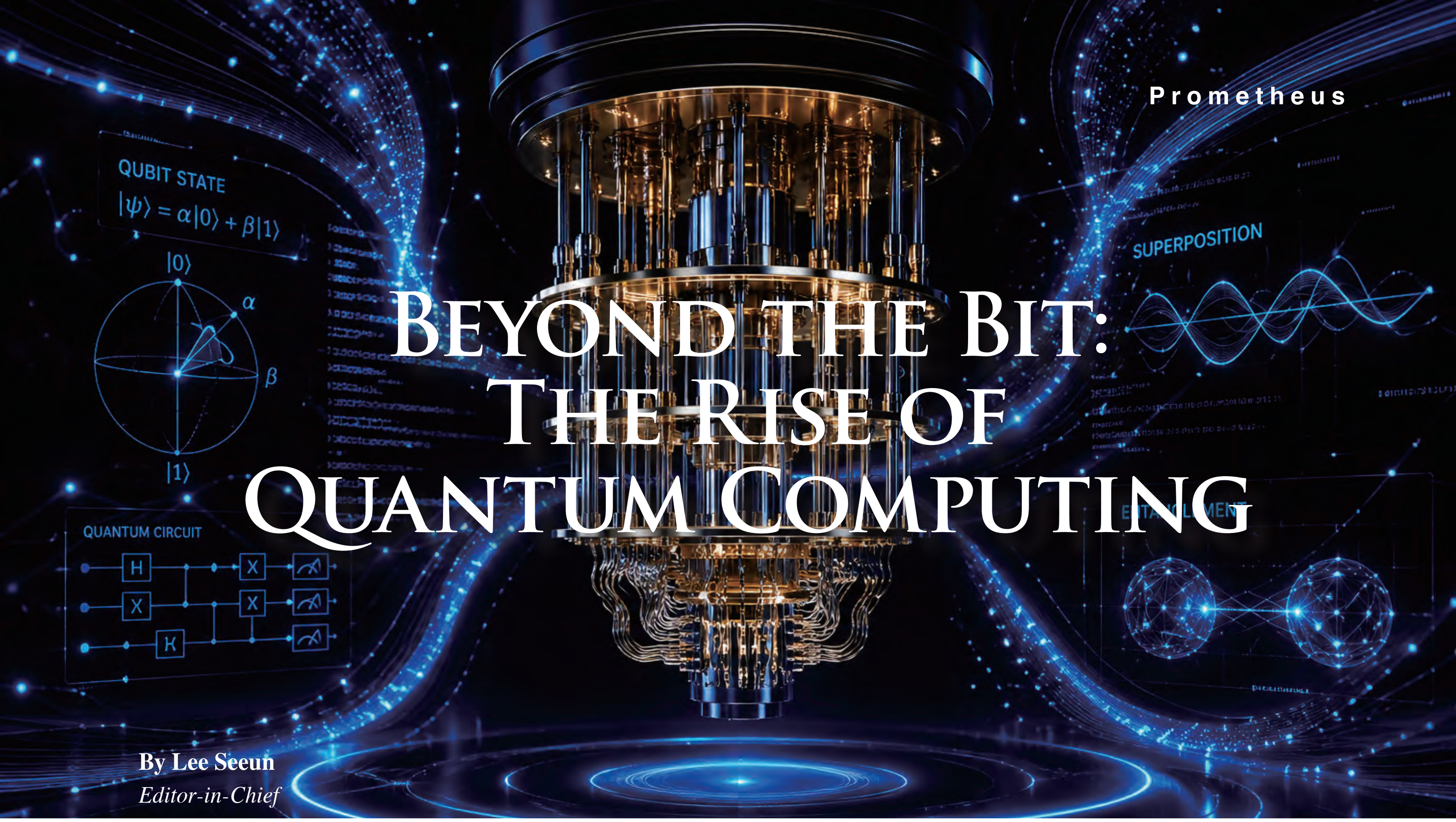


Beyond the Bit: The Rise of Quantum Computing

By Lee Seeun
Editor-in-Chief

What if all the encryption systems we rely on today could be broken in seconds, and calculations that currently take decades could be completed instantly? How would life change if solutions to complex problems, such as drug development and climate change prediction, could be found in moments? What once seemed possible only in the distant future is now approaching reality with the emergence of quantum computers. Quantum computing is a field of computer science and engineering that leverages the properties of quantum mechanics to solve problems beyond the capabilities of even the most powerful classical computers. In recent years, the quantum computing industry, a next-generation technology capable of processing information too complex for conventional computers, has moved beyond a research-centered phase and entered commercialization, with competition intensifying over this core infrastructure. In line with this trend, South Korea (hereafter Korea) has also announced that, in its effort to become one of the world's top three AI powers and top five science and technology leaders through quantum-AI, it will launch a cluster bidding process for local governments in May, while aiming to achieve full localization by 2028.

However, the advancement of quantum computers presents not only new possibilities but also risks that could disrupt existing systems. In particular, current encryption systems may be rendered obsolete, making the development of countermeasures urgent. In response, The Argus aims to examine the concepts and operating principles of quantum computers, while also analyzing the expected changes and potential risks associated with their commercialization, in order to help readers gain a broader understanding of this technology as it approaches everyday use.

[Before Reading] Quantum Mechanics

Quantum mechanics is the branch of physics that deals with phenomena in the microscopic world, including atoms, electrons, and molecules, which are too small to be seen with the naked eye. Until the late 19th century, classical mechanics, which formed the foundation of physics, explained motion in the macroscopic world experienced in everyday life and held that outcomes are determined by cause-and-effect relationships. However, as advances in technology made it possible to observe the microscopic world, phenomena emerged that could not be explained by classical mechanics, such as discontinuous changes in a particle's energy. Quantum mechanics was developed to account for these observations. It approaches the state of a system not as a fixed value but in probabilistic terms, proposing that multiple states coexist until measurement, at which point the system resolves into a single value.

Concepts

1) A New Paradigm of Information Processing

How do computers, which assist with information processing in everyday life, recognize vast amounts of data such as text, images, and videos? Computers do not understand this complex and diverse information directly. Since they fundamentally operate based on electrical signals, they can distinguish only between two states: the presence or absence of a signal. When expressed numerically, these two states correspond to 0 and 1, and computers process all data using this binary system. A single digit in this system, the smallest unit, is called a "bit." In other words, a bit is the most basic unit used by classical computers to process information. By combining bits, computers store and process all digital information, including text, numbers, images, and videos.

How, then, do computers process information using 0 and 1? All computations performed by a computer take place within a device called the central processing unit (CPU). The CPU functions as the brain of the computer and is a core piece of hardware in which hundreds of millions of tiny switches, known as transistors, open and close to control signals. Here, computation does not simply mean adding numbers. It refers to the process of logical decision-making in which input bits pass through logical circuits such as adders and are transformed according to specific rules. The resulting combinations of 0s and 1s are then converted into unique codes through encoding, which transforms information into visible digital data. For example, a particular combination of numbers may correspond to the color value of a single pixel on a display. In this way, imperceptible changes in microscopic electrical signals undergo computational and encoding processes within the CPU, ultimately becoming visible digital information such as text and images perceivable to humans.

The binary system of classical computers has driven computer engineering for decades. The reason commonly used computers are referred to as classical computers is that they follow determinism, a principle of classical mechanics, which governs the macroscopic world. Just as the motion of objects in classical mechanics is determined by cause-and-effect relationships leading to a single outcome, each bit in a classical computer is also fixed in a definite state, either 0 or 1, based on the physical condition of electrical flow. However, as exploration of the microscopic world advanced in the late 20th century, limitations began to emerge. In fields such as analyzing the molecular structure of drug candidates, where trillions of atoms interact, or simultaneously calculating global climate variables, the limitations of the sequential structure of classical computers became evident. Because classical bits must evaluate every possible case individually, the amount of computation increases exponentially as variables increase, leading to a phenomenon known as combinatorial explosion. As a result, problems emerged that would take tens of thousands of years to solve even with the most powerful supercomputers. To address these limitations, at the Conference on the Physics of Computation jointly hosted by Massachusetts Institute of Technology and IBM in 1981, American theoretical physicist Richard Feynman proposed the concept of a quantum computer, arguing that nature is not classical and that, to simulate nature, computers must operate based on quantum mechanics.

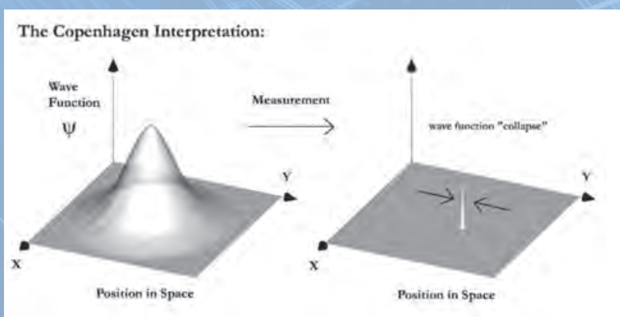
To realize Feynman's proposal, a new fundamental unit of information, the quantum bit, qubit, was introduced. While classical computers generate bits, which represent definite information of 0 or 1, based on differences in voltage, quantum computers use the physical states of quantum entities, such as electrons or ions, as information. A quantum is the smallest indivisible unit of energy and possesses physical properties entirely different from those of matter in the macroscopic world. By leveraging these unique properties, quantum computers perform computations that go beyond the limitations of classical bits.

2) Quantum Superposition and Interference

Quantum computers utilize unique microscopic phenomena for computation. What principles do they rely on, and how are these applied in quantum computing?

The first key concept is quantum superposition. Superposition is a fundamental mechanism of quantum mechanics that distinguishes it from binary bits in classical computing systems. Unlike classical bits, which can exist in only one state, either 0 or 1, qubits can exist in both states simultaneously in superposition. In other words, until a qubit undergoes measurement, an interaction with the external environment, its state is not fixed but exists probabilistically as a combination of both 0 and 1. At the moment of measurement, the qubit is observed as either 0 or 1 according to a probability distribution. For example, if there are three qubits, a classical system can represent only one of eight possible states, such as 000, 001, 010, 011, 100, 101, and 111, at a time. In contrast, a quantum system can contain all eight states simultaneously within a single superposition. Each measurement yields one of these states at random according to probability, and repeated measurements reveal each state with a corresponding frequency. This means that with n qubits, a quantum computer can process 2^n states at once, forming the basis for its ability to handle large computational spaces.

In practice, quantum superposition is described not simply as a probability distribution but as a wave function. A wave function is a complex-valued function that represents the state of a quantum system and describes the probability amplitude of finding a particle at a given point in space and time. Its graph takes the form of a wave that oscillates and spreads through space. When a qubit is said to exist in both 0 and 1 states, it means that the possibilities of being 0 and 1 coexist within a single wave, like the peaks and troughs of a wave. However, this wave loses its original properties at the moment of measurement. When observed, the wave function that had been spread over space collapses to a single point, a phenomenon known as wave function collapse. In this process, the multiple probabilistic possibilities in superposition are reduced to a single definite outcome through measurement.



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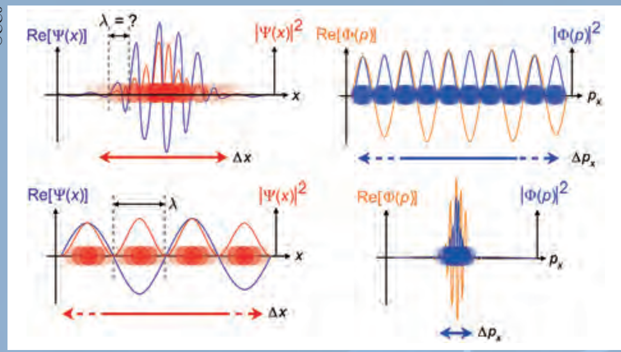
▲ A wave function collapses into a single state when measurement occurs.

The principle that enables a quantum computer to find the correct answer among the many computational paths created through superposition is quantum interference. Quantum interference occurs when multiple superposed wave functions combine to form a new wave, with the amplitude changing depending on phase differences between the waves. When the phases align so that crests meet crests, the amplitude increases: a phenomenon known as constructive interference. Conversely, when crests meet troughs, the amplitude is reduced or canceled out: a phenomenon known as destructive interference.



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▲ Quantum interference occurs when waves combine, amplifying or canceling probabilities depending on their phases.

Within quantum algorithms, the probability amplitude of the correct answer is amplified through constructive interference, while the amplitudes of incorrect or irrelevant results are reduced close to zero through destructive interference. The combination of probabilities in this context refers to the addition of wave amplitudes, ultimately increasing the probability density of obtaining the correct answer upon measurement. In summary, superposition enables a range of computational possibilities, while interference selects the correct outcome by controlling the phases among those possibilities.

3) Quantum Entanglement and Decoherence

Another key principle applied in quantum computing is quantum entanglement. Entanglement refers to a state in which two or more qubits form strong correlations and behave as a single system. As qubits are not abstract data units but physical entities such as electrons or ions, information is stored in their quantum states, including properties such as spin or energy level. In an entangled state, these physical states are interconnected, so that even when separated by large distances, measuring the state of one qubit determines the state of another in a nonlocal manner. By using entanglement, quantum computers can share and synchronize information across qubits, allowing entangled qubits to work together simultaneously and enhance computational efficiency.

However, these advantages of quantum computers are valid only when quantum coherence is maintained. Coherence refers to the stable preservation of quantum properties such as superposition and entanglement, with the phase of the wave intact. Unlike classical computers, which determine 0 and

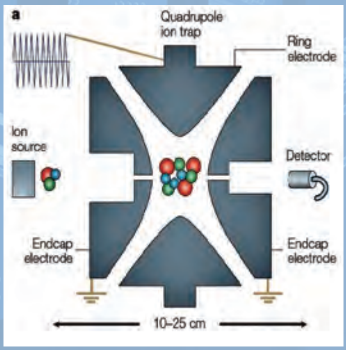
1 through electrical signals based on the flow of electrons, quantum computers rely on the delicate states of particles themselves, making them highly sensitive to external environments. Decoherence occurs when interactions with external factors, such as slight temperature changes or electromagnetic fields, disrupt the phase information of the wave and cause the quantum state to revert to a classical state. When decoherence occurs, the superposed information is destroyed, leading to computational errors. As a result, the ability to maintain and control quantum states over extended periods is a critical factor that determines the performance of quantum computers.

Ultimately, the commercialization of quantum computing depends on the ability to suppress decoherence and build hardware environments that can sustain quantum coherence for as long as possible. Against this backdrop, research teams around the world are engaged in technological competition over how to physically implement qubits and isolate them from external interference.

Principles

1) Ion Trap Approach

What methods are used to create the environment required for quantum computing? One of the most common hardware implementation methods is the ion trap. An ion trap is a technology that captures charged atoms, or ions, in a vacuum using electromagnetic forces and uses them as qubits. Typically, one electron is removed from atoms such as calcium or barium to give them a positive charge, after which electric fields are applied from multiple directions to hold the ions in place. Quantum computers store qubit information, 0 and 1, by utilizing the energy levels of these trapped ions.



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▲ An ion trap confines charged atoms using electromagnetic fields, allowing them to function as qubits.

The key to constructing an ion trap system is maintaining an extremely high vacuum within a chamber. A vacuum chamber is essential to preserve quantum coherence. If even a small number of air molecules remain in the chamber and collide with the ions, decoherence occurs immediately, destroying the superposition state of the ions. Therefore, a completely isolated vacuum environment is required to block thermal interactions and physical interference.

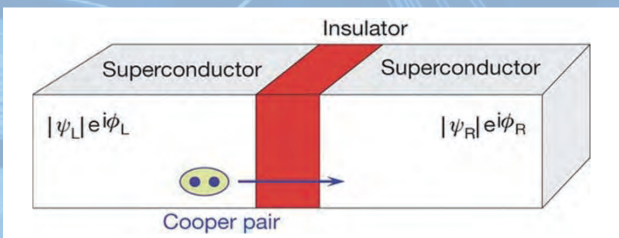
To use these isolated ions for computation, researchers employ precise laser beams as control tools. When a laser of a specific frequency is directed at an ion, the electron inside the ion absorbs or emits energy and transitions between energy levels. This allows the electron to move between the ground state, the lowest energy level, and the excited state, a higher energy level. By controlling the intensity and duration of the laser, it is possible to create a superposition in which the electron exists across both states. In addition, by using shared vibrational modes between ions, entanglement operations that link their states can also be performed.

The greatest advantage of this approach is its longer coherence time compared to other implementation methods. Due to the inherent physical stability of atoms, computational errors are low and reliability is high. However, because ions must be arranged in a linear structure within an electromagnetic field, it is difficult to scale qubits to the thousands. Additionally, laser-based control is relatively slow, which presents another limitation.

2) Superconducting Approach

While the ion trap method captures individual atoms, another hardware approach currently being researched is the superconducting qubit, which is based on metal circuits. The superconducting approach utilizes the phenomenon of superconductivity, in which electrical resistance disappears when certain metals are cooled to extremely low temperatures close to absolute zero, which is minus 273°C. In a state without resistance, tiny currents flowing through a circuit can circulate indefinitely without energy loss. Quantum computers use the flow of this current or the state of electric charge and convert it into qubit information, 0 and 1, for computation.

The core device in implementing superconducting qubits is the Josephson junction. A Josephson junction consists of two superconductors separated by a very thin insulating layer, and it exploits quantum effects that occur when current passes through this barrier. Unlike conventional circuits, superconducting circuits containing Josephson junctions have energy levels that are unevenly spaced rather than at regular intervals. Among these, the two lowest energy states are selected and defined as the digital states 0 and 1. By applying microwaves to the qubit, researchers can precisely control its energy, allowing the qubit to exist in a superposition of 0 and 1 or become entangled with other qubits. To maintain the superconducting state, an environment colder than outer space is required. This is achieved using a large device called a dilution refrigerator, which prevents decoherence, in which minimal thermal energy can break superconducting coupling and destroy quantum information. The greatest advantage of the superconducting approach is that it can use thin-film fabrication technologies similar to existing semiconductor processes, making large-scale circuit design and qubit expansion relatively easy. In addition, because it is directly controlled by electrical signals, it offers high computational speed.



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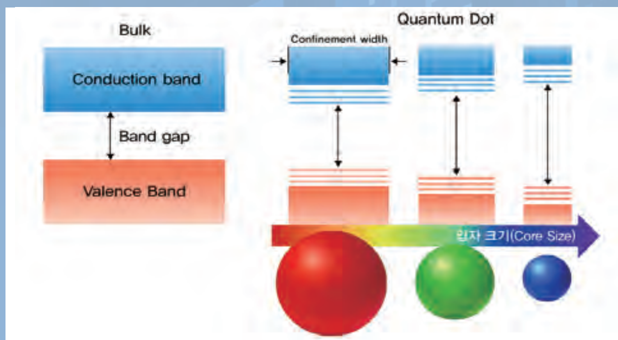
▲ Josephson junction uses two superconductors separated by an insulator to form the basis of superconducting qubits.

3) Quantum Dots

While the ion trap method uses naturally occurring atoms and the superconducting approach relies on large-scale circuit design, the quantum dot approach applies semiconductor technology, which is central to modern electronic devices, with high precision. A semiconductor refers to a material whose electrical conductivity can be freely controlled by applying voltage, and the quantum dot approach can be understood as creating extremely small boxes on the nanometer scale on a semiconductor substrate.

To understand this technology, it is necessary to first consider the concept of bulk. Bulk refers to the solid state of matter commonly encountered in everyday life. In this state, numerous atoms are bonded together, and the energy levels available for electrons to move form a continuous structure similar to a wide highway. However, when the size of a material is reduced to a scale smaller than the wavelength of an electron and confined within a nanometer-scale space, a unique phenomenon called quantum confinement occurs.

Quantum confinement is a phenomenon in which electrons that once moved freely in a wide space become confined in a very small region, causing their energy to exist only at discrete values. This can be compared to a child who once ran freely in a large field but is now confined to a small room, where movement becomes restricted and only certain actions are possible depending on the size of the space. As a result, the previously continuous range of energy levels becomes discrete, resembling steps. Due to these properties, quantum dots, although not actual atoms, exhibit energy structures similar to those of atoms and are therefore referred to as artificial atoms, serving as key components in qubit implementation.



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▲ Quantum dots create discrete energy levels by confining electrons in nanoscale semiconductor structures.

By isolating a single electron within this artificial atom, information is stored using the electron's spin, a property related to rotation. Information is distinguished based on whether the electron spins in a clockwise or counterclockwise direction, and by applying a magnetic field, a superposition state in which both directions exist simultaneously can be created. In addition, interactions between electrons in neighboring quantum dots are induced to realize entanglement, which is essential for computation.

The greatest strength of this approach lies in its productivity and scalability. Because it can utilize silicon semiconductor manufacturing processes that have been developed over decades, qubits can be made much smaller than in other approaches, making it highly advantageous for large-scale integration, with the potential to place millions of qubits on a single chip. In fact, the U.S. chipmaker Intel has demonstrated the potential for commercialization by unveiling chips produced using this process. Although controlling the spin state of electrons is technically challenging due to its sensitivity, Korea, as a leading semiconductor nation, is also striving to secure technological leadership through research achievements led by related institutions.

Prospects

1) Research Trends

The quantum computing industry has moved beyond concept verification and entered a phase of commercialization, aiming to build systems that can be practically used. While increasing the number of qubits was once the primary indicator of technological capability, the focus has recently shifted toward how stably errors can be controlled.

For example, IBM unveiled its 1,121 qubit superconducting processor, Condor, at the IBM Quantum Summit in 2023, marking an important milestone in integration density. More noteworthy than simple qubit expansion, however, is the introduction of a modular architecture called System Two, which connects multiple processors to operate as a single system. This suggests that future large-scale quantum systems may evolve into network-based structures rather than single-chip designs.

Meanwhile, Google demonstrated practical progress in quantum error correction through research published in *Nature* in 2023. According to the study, beyond a certain threshold, increasing the number of qubits can reduce the error rate, overcoming the previous limitation that more qubits lead to more errors. This scaling advantage provides important evidence that reliable quantum computation may be achievable in the long term. IonQ, on the other hand, emphasizes stable qubit control and high fidelity based on the strengths of the ion trap approach. In particular, it has proposed systems based on barium ions that can operate in environments closer to room temperature, aiming to reduce dependence on the extreme low-temperature equipment required by superconducting approaches. As such, the current competition has shifted beyond simple performance demonstrations to a race to establish technological standards across three key dimensions: scalability, stability, and operational feasibility.

2) Field of Applications

One of the most fundamental challenges in life sciences is accurately predicting the three-dimensional structure of proteins. Proteins are highly complex systems composed of numerous interacting atoms, and the number of possible configurations increases exponentially. As a result, classical computers are often forced to rely on approximate calculations and face limitations in replicating real biological environments.

Quantum computers differ fundamentally in that they calculate such problems in a physically analogous way. Since molecules themselves are quantum mechanical systems, simulations using qubits can represent interactions between molecules more naturally. In particular, the ability to explore multiple states simultaneously through superposition and to amplify meaningful solutions through interference is advantageous for calculating complex energy states. If this technology becomes practical, the process of identifying candidate materials, which currently takes the most time in drug development, could be shortened. Furthermore, designing personalized treatments based on an individual's genomic data may become a more realistic possibility.

Quantum computers require special conditions such as ultra-low temperature cooling systems and vacuum environments, making them difficult for individuals or ordinary companies to own directly. These physical constraints are, in turn, accelerating the expansion of cloud-based service models. Platforms such as IBM Quantum and Amazon Braket allow users to access quantum processors remotely via the internet.

Despite being an early-stage technology, this provides researchers and developers around the world with an environment to experiment with quantum algorithms. In the future, a hybrid structure in which classical computers and quantum computers share roles is likely to become standard. In this model, quantum systems handle complex optimization problems or specific calculations, while classical systems manage data processing and control. This suggests that quantum computers will not completely replace existing computing systems but will instead function as complementary infrastructure.

Modern artificial intelligence has developed based on large-scale data and computation, but it faces structural limitations as models grow larger, leading to increasing computational costs and energy consumption. In particular, during neural network training, finding optimal weights becomes a combinatorial explosion problem, where the number of possible cases increases exponentially as variables grow. Quantum computers provide parallelism that allows exploration of multiple possibilities simultaneously.

By considering multiple solutions at once through superposition and amplifying correct outcomes through interference, they offer advantages in solving optimization problems. Ahn Jaewook, professor in the Department of Physics at Korea Advanced Institute of Science and Technology said, "Optimization problems appear to be one of the fields most likely to be commercialized first, as they can effectively utilize quantum computers' ability to explore parallel states and are relatively suitable for hybrid collaboration with existing supercomputers." Although current research remains at a theoretical and early algorithmic stage, quantum machine learning is expected to complement the learning speed of classical AI or achieve advantages in specific problem domains. In particular, its potential applications are being explored in large-scale optimization, probabilistic sampling and complex pattern recognition.

3) Issues and Solutions

Most security technologies used in everyday life, including internet banking, e-commerce and messaging services, are based on public key cryptography represented by RSA. The core of this encryption system relies on the mathematical difficulty of factoring extremely large numbers, a task that would take an impractically long time even for modern classical supercomputers. For example, factoring a number with hundreds of digits to break encryption would require tens of thousands of years using existing supercomputers, making hacking effectively impossible.

However, the emergence of quantum computers is challenging this assumption. In 1994, American mathematician Peter Shor introduced Shor's algorithm, which theoretically demonstrated that quantum computers could solve the factorization problem almost instantly by utilizing superposition and interference. While classical computers use a sequential approach, testing each possibility one by one to find the correct answer, quantum computers have the potential to neutralize existing encryption in seconds by exploring all possibilities simultaneously through parallel computation. Professor Ahn said, "The point at which quantum computers could practically neutralize the RSA encryption system is generally expected to fall within the next 10 to 30 years, but the lower end of this range appears to be moving closer due to the rapid development of related technologies."

In response to quantum computing, the global security industry is accelerating research on post-quantum cryptography (PQC). PQC refers to encryption systems based on new mathematical algorithms, such as complex lattice structures, that remain difficult to break even with the powerful computational capabilities of quantum computers. This is considered a critical technological infrastructure to prepare for the moment when quantum computers become practical and current encryption systems are rendered ineffective, often referred to as Q Day.

Research in this field has already moved beyond the theoretical stage and entered phases of standardization and implementation. The National Institute of Standards and Technology in the United States is selecting standard algorithms for PQC through a multi-year evaluation process, thereby reshaping global security standards. In Korea, research institutions and private companies are actively developing domestic PQC algorithms, and telecommunications companies have recently completed successful tests applying these technologies to real communication networks, signaling a transition toward commercialization. Ultimately, the future of security is moving not toward countering quantum threats with quantum principles, but toward building mathematical barriers that even quantum computers cannot overcome.

Quantum computing is rapidly evolving from theory to practical technology, offering a new computational paradigm that surpasses the limitations of classical systems. By leveraging principles such as superposition and entanglement, it enables more efficient solutions to complex problems while driving innovation across multiple fields. At the same time, its development brings both opportunities and risks, particularly in areas such as security, where existing encryption systems may become vulnerable. As a result, efforts to develop complementary technologies are becoming increasingly important. Rather than replacing classical computing, quantum technology is likely to function as a complementary system. Understanding its potential and limitations will be essential as it becomes part of future technological infrastructure.

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No. 556 (March Issue)

Article Review: International Law and Its Role in Maintaining Peace and Security

▲ Original Article

Yoo Chae-hyeon (*Cub Reporter*)

This article examines the development and limitations of modern international law, focusing on the UN Charter as the foundation of the contemporary legal system. It traces how international law emerged from the devastation of two World Wars to establish a legal order among sovereign states. By analyzing cases like the invasion of Ukraine, the article illustrates how political realities, particularly the veto power of permanent Security Council members, can hinder the enforcement of international norms.

The article clarifies the structural framework of international law. It highlights that sovereign equality, the prohibition of force, and peaceful dispute resolution are the pillars of the UN Charter. By linking these principles to real-world politics, it helps readers understand the practical context in which international law operates.

However, the analysis emphasizes structural weaknesses over practical influence. While international law lacks a centralized enforcement body, the article overlooks indirect mechanisms, such as diplomatic pressure, economic sanctions, and reputational costs, that shape state behavior. Furthermore, focusing solely on legal interpretations can oversimplify complex conflicts, making international law seem more fragile than it is in practice.

In summary, while the article provides a useful introduction to global legal challenges, a more balanced view of its functional impact would strengthen the analysis. Despite its flaws, international law remains an essential framework for global stability.

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Jang Ye-seo (*Cub Reporter*)

This article explains the role of international law in maintaining global peace and order, while addressing its limitations. It first introduces the formation and purpose of international law based on the UN Charter, and then connects it to real-world cases such as the Russia-Ukraine war, nuclear issues, and the U.S. intervention in Venezuela. Through these examples, the article shows how international law is applied in practice and suggests that its effectiveness can be limited by political interests and structural problems, especially when powerful states choose not to follow or selectively interpret it.

The article begins with an explanation of the basic concepts and background of international law and then moves on to specific cases. The discussion of issues such as the UNSC veto in the Russia-Ukraine conflict, the ambiguity of self-defense in relation to nuclear threats, and the conflict with the principle of sovereign equality allows readers to see the limitations of international law more clearly. Also, the article presents a balanced perspective by emphasizing the importance of international law and its limitations. It explains that international law does not have a strong enforcement mechanism and that its application often depends on the political will of states.

However, the article does not suggest concrete solutions sufficiently. For instance, it mentions key issues such as the veto power of the UNSC and the ambiguity in interpreting the right of self-defense, but it does not fully explore how these problems could be addressed. In addition, some of the cases focus more on describing the problem rather than analyzing their long-term implications or potential changes.

To improve the article, it would be helpful to include more practical solutions. For example, discussions on UNSC reform, limits on veto power, stronger cooperation among international organizations, or the development of clearer international norms could strengthen the argument. It would also be useful to provide a clearer outlook on how international law might evolve in response to changes in the global environment. Overall, this article encouraged readers to think about international law not just as an ideal system, but as something that continuously interacts with political realities.

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A Pause, or a Step Forward?

Lee Seeun

The last time I truly took a break was during the summer vacation after the first semester of 2024, a period filled with new challenges. It was my first semester as a reporter for The Argus and my first time studying at the Seoul Campus for my double major. After months of pressure, I traveled to Vietnam and Japan with friends. The experience felt both relaxing and fulfilling, becoming one of the most memorable trips of my life. It helped me recharge and realize that rest feels most meaningful after sustained effort, allowing me to move forward again.

Cho Subin

I believe that "just resting" can be a courageous choice and a vital experience. During my last gap semester, I lacked that courage. I was obsessed with my employability and terrified of falling behind in the job market. I felt a constant pressure to meet the expectations of a competitive world. However, experiencing the wider world changed everything. I realized that I am the one behind the wheel of my life. Now I see rest not as stopping, but as a vital stepping stone toward a brighter future as I traverse at my own pace.

Kim Yi-eun

Last year, I took a semester off followed by an exchange program, spending the entire year traveling and relaxing. I decided to take that leave of absence because I knew it was a once-in-a-life time opportunity, and it truly became the most brilliant chapter of my university life. However, although it was a period of rest, I also felt a sense of anxiety about my upcoming graduation. Now, leaving that dreamlike break behind, I am ready to use the renewed sense of purpose I gained last year to move forward once again.

Park Se-eun

Last semester, I took a leave of absence from the university. During that period, I felt overwhelmed by my role as Editor-in-Chief and the uncertainty of my future career path. Having free time during the absence was liberating, but it also brought moments of anxiety. Nevertheless, this period gave me time to think about what I truly want to do and to organize my thoughts about my future. Eventually, it helped me better understand myself and become closer to the person I aim to be.

Special Thanks to

Prof. Ryu Sang-il, Legislative Researcher Park Yunjung, Prof. Carol Norberg, Prof. Gauthier Lanot, Prof. Tomas Sjogren, and Prof. Ahn Jaewook

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